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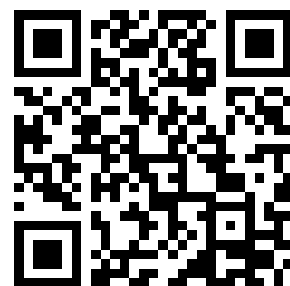
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ELECTRIC RAILWAY JOURNAL
v.69, no.9, Feb.26, 1927 missing

Annual Statistical and Progress Number

ELECTRIC RAILWAY JOURNAL

McGraw-Hill Co., Inc.

January 5, 1924

Twenty Cents Per Copy

1924

All the earmarks of a *Prosperous* NEW YEAR

North, South, East and West the coming of another New Year finds Phono-Electric installed in ever increasing quantity.

It witnesses the breaking of many an endurance record by this tougher-than-copper trolley wire.

We can do no better, therefore, than wish you the prosperity of Phono-Electric's *proven economy*.

Details on Request



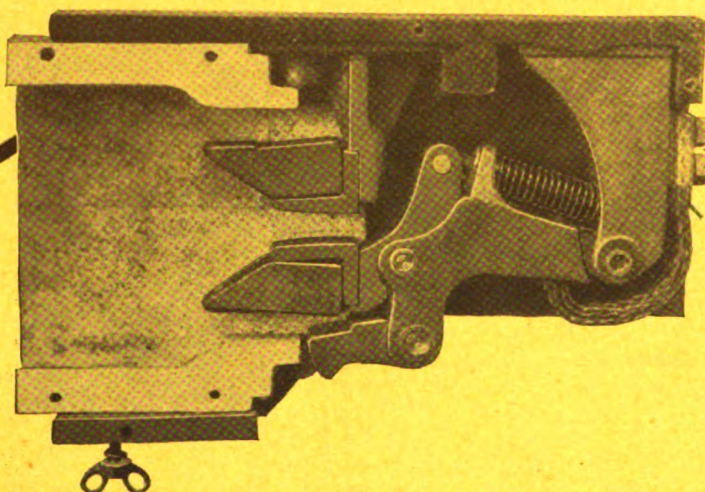
Bridgeport
Brass Company
BRIDGEPORT - CONNECTICUT



New Ideas For Old

In Westinghouse Railway Renewal Parts

Type 480
Switch Unit for
HL Control



A New Construction for renewal or replacement parts does not indicate inadequacy of the old, but rather an advance in the art of apparatus design.

By replacement of a few parts in your 251 or 264 switches you can—

Increase the life of contacts and arcing horns.
Decrease the maintenance of arc chutes.
Eliminate the breakage of finger springs.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Sales Offices in All Principal Cities of the United States and Foreign Countries



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Cable Address: "Machinist, N. Y."

Publishers of

Engineering News-Record
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The Record of Progress

THIS statistical and progress number, long an annual feature of the ELECTRIC RAILWAY JOURNAL, presents the reader with a review of what has taken place in the electric railway industry during the past year and to a limited extent gives him an idea of what may be expected to take place during the coming year.

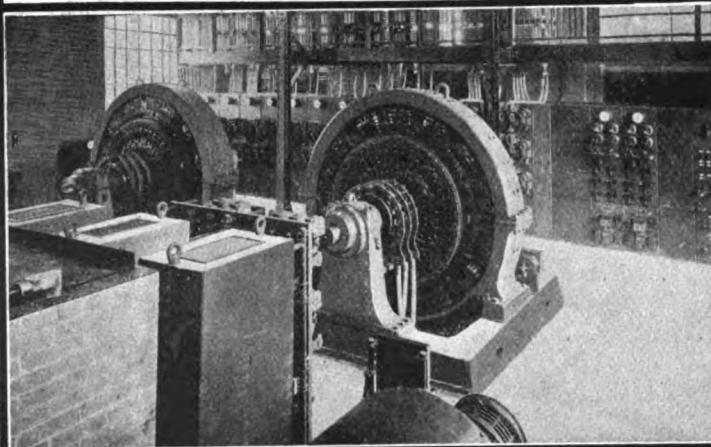
To gather this information has required several comprehensive surveys that have called for a great deal of effort by the editors and the co-operation of practically all the electric railways in the country. To the latter is due the thanks of this paper and of the entire industry.

The surveys conducted year by year cover the mileage of track constructed and rebuilt, including this year information as to whether the track is open or in paving; the number of cars each company purchased during the year, classified by types; complete information on the status of receiverships; and estimates of the electric railway budget for the year just begun.

A new feature this year is a survey of the industry to determine to what extent the electric railways are using the bus. Data are published giving by companies the number of buses operated, the kind of service in which they are used, and the number of buses purchased during the year.

The trend figures of prices and wages for the industry and statistics as to the size of the industry are included as usual, as are also the data as to maturities to be met during the coming year, principal financing of 1923, and an effort to indicate the present credit conditions of the industry as viewed by the bankers.

The information published in this issue annually has come to be accepted as authoritative and is widely quoted, as it can be obtained in no other way.



"Heights" Station in service since December 15, 1920.

THE CLEVELAND RAILWAY COMPANY
operates the largest automatic
substation system in the world.

The "Pioneer User" of automatic
substation equipment in metropol-
itan service recently placed an order
for four Two Unit 3000 Kilowatt
Automatic Substations and Appa-
ratus to complete two single unit
stations.



This will make a total of nine
stations, aggregating 24,000 kilo-
watts and constituting the most
comprehensive installation of auto-
matically controlled railway sub-
station equipment in existence.



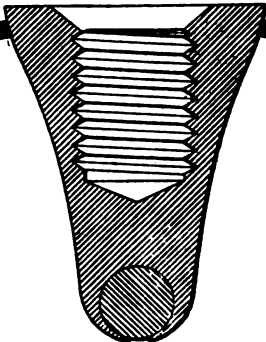
Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

Westinghouse

For Service Use Westinghouse Low-Center Trolley Ears

Made in 12-inch and
15-inch lengths.

For All Sizes of
Round Wire.



Full-Scale Section of Westinghouse Type-EL
Low-Center Trolley Ear, Height at Boss $1\frac{3}{4}$ inches.

The distribution of the metal at the center of the ear is such, that when used on curved construction, and subjected to side pull, the ear assumes an easy, curved form. Furthermore, the design prevents any danger of the trolley wheel striking the boss of the ear.

The composition of the material used in making the ears is the standard A.E.R.A. formula. Each heat is tested to assure uniform quality.

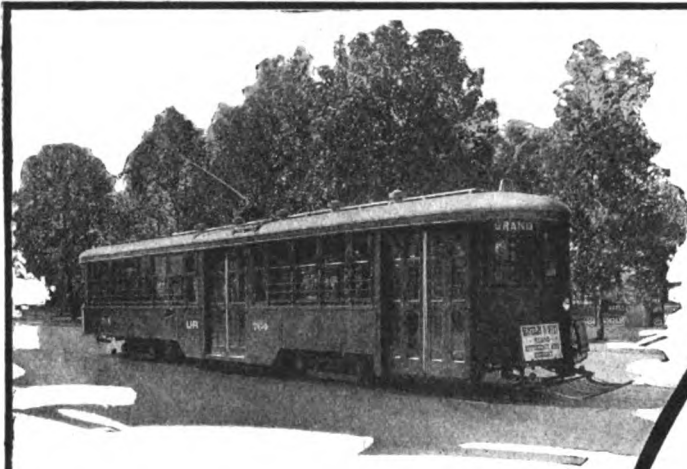
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East Pittsburgh, Pa.

Sales Offices in All Principal Cities of the United States and Foreign Countries



Westinghouse

Transportation Development

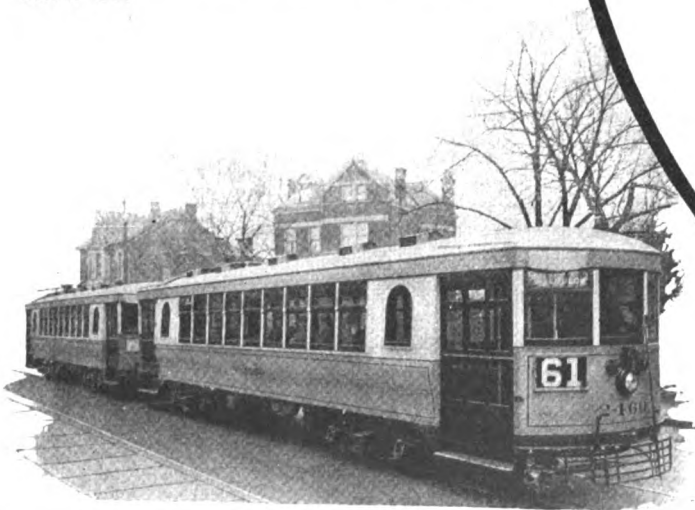


Among the electric roads which have recently increased their freight haulage service are:

Interstate Public Service Co.
Niagara Junction Railway Co.
Iowa Southern Utilities Co.
Northeast Oklahoma R.R. Co.
Pacific Electric Railway Co.
Glendale & Montrose Rwy. Co.
Springfield Terminal Rwy. Corp.
The Kansas City Rlys. Co.
Detroit United Railway Co.
The Chicago, North Shore & Milwaukee R.R. Co.

The year 1923 has witnessed the further adoption of economically designed double truck cars for both city and interurban service.

The flexibility of such cars, when equipped with multiple-unit control, permits the operation of single units by one or two men, or train operation of two or more cars. Reduced operating costs and increased track capacity are among the benefits thus obtained.

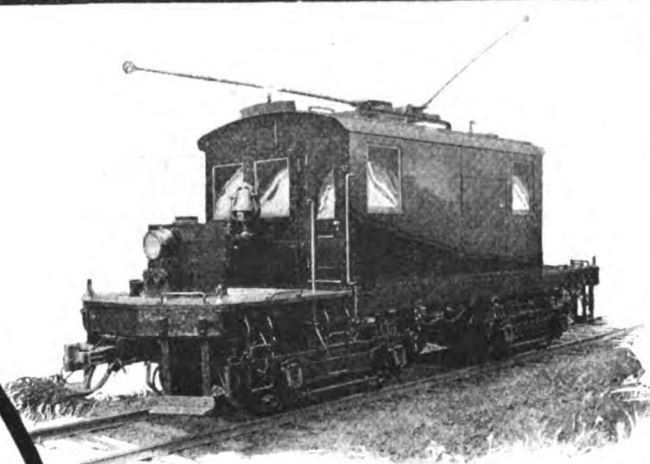


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East P

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and Foreign Cities

Westinghouse

Freight-Haulage Expansion



During 1923 many electric roads have recognized the financial benefits of expanding their freight haulage service. Some roads have added freight motor cars equipped with Westinghouse apparatus, and many have purchased Baldwin-Westinghouse locomotives.

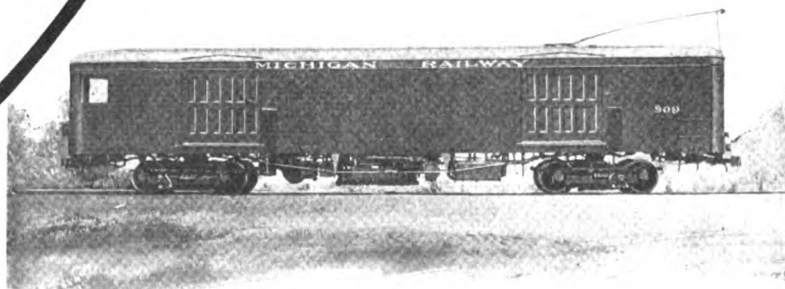
Westinghouse equipment is a standard in freight service throughout the country.

Among the electric roads which have recently increased their freight haulage service are:

Interstate Public Service Co.
Niagara Junction Railway Co.
Iowa Southern Utilities Co.
Northeast Oklahoma R.R. Co.
Pacific Electric Railway Co.
Glendale & Montrose Rwy. Co.
Springfield Terminal Rwy. Corp.
The Kansas City Rwys. Co.
Detroit United Railway Co.
The Chicago, North Shore & Milwaukee R.R. Co.

Manufacturing Company
burgh, Pa.

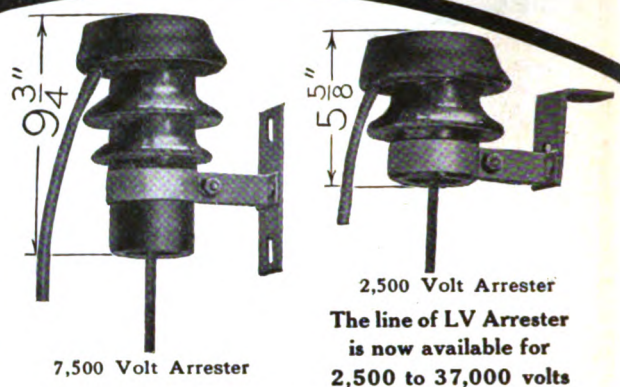
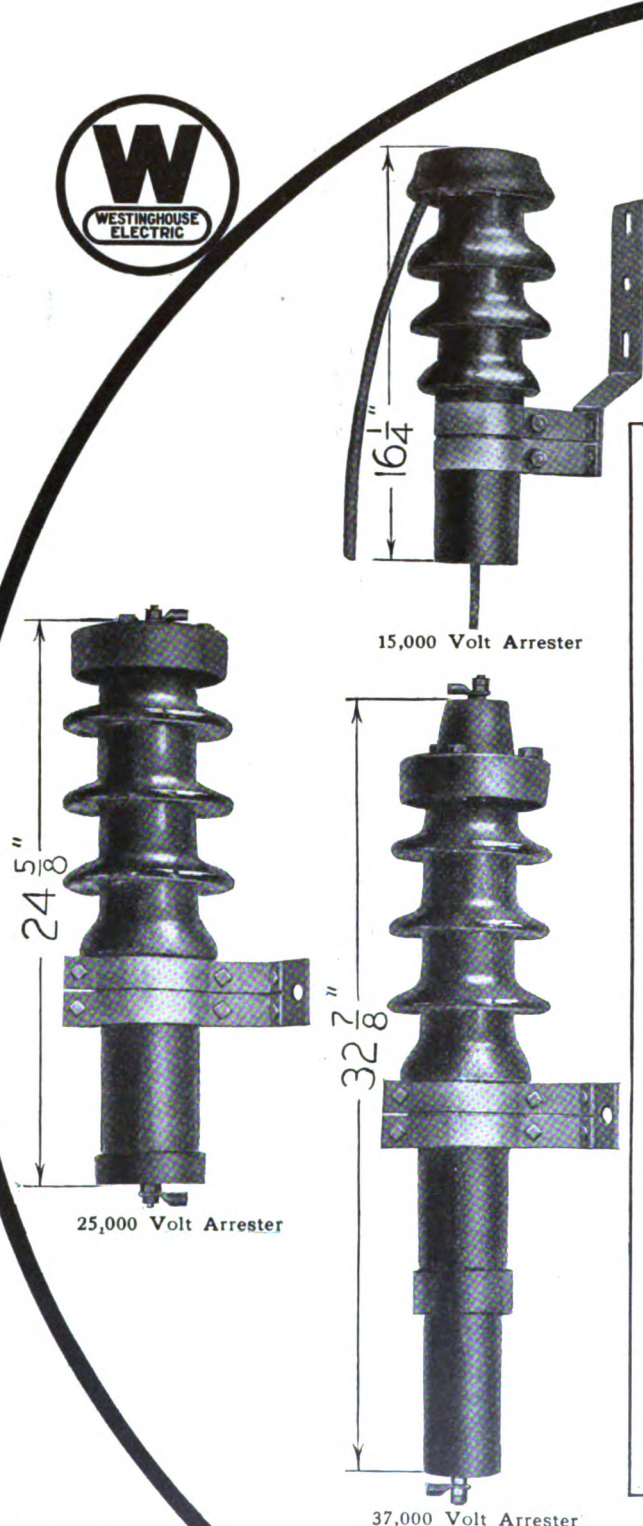
Cities of the United States
Countries



Westinghouse

Westinghouse Autovalve Arresters

High Protection at Low Cost



2,500 Volt Arrester
The line of LV Arrester
is now available for
2,500 to 37,000 volts

Simple because the bracket can be attached to the cross-arm with a single bolt or clamp.

Safe because the arrester can be mounted directly under the line wire, giving the maximum climbing space, and greater safety to linemen.

Inexpensive, first, because there is less breakage when installing, the mounting bolt or clamp being attached to the metal bracket and not to fragile porcelain. Second, because all sizes can be mounted from the same cross-arm which supports the line insulators.

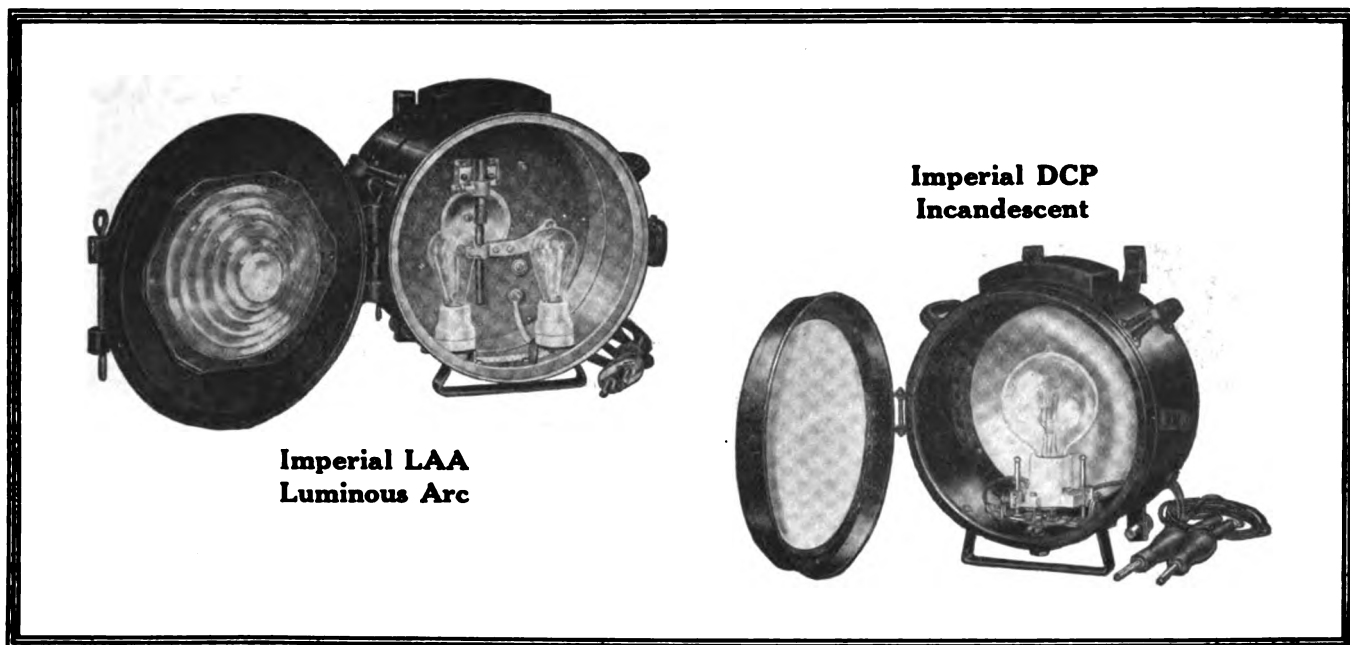
Service tests from thousands of arresters installed on commercial distribution systems, and extending over three lightning seasons, have demonstrated the reliability and the effectiveness of these arresters.

Descriptive Leaflet 20013-B, gives full particulars

Westinghouse Electric & Mfg. Company
East Pittsburgh, Pa.

*Sales Offices in all Principal Cities of the United States
and Foreign Countries*

Westinghouse



**Imperial LAA
Luminous Arc**

**Imperial DCP
Incandescent**

Imperial *Interurban* Headlights Two Popular Types

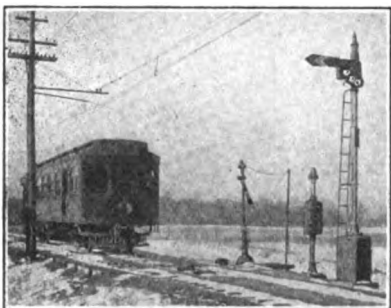
LAA Luminous Arc. Furnished with attachments for single or double end use. Operates on wide voltage range. Has two incandescent lamp sockets for dimming light in city. Standard with clear, inverted semaphore lens. Optical or "Spreadlite" semaphore lens optional.

DCP Incandescent. Sheet steel case with top- or side-hinged door. Portable type for double end use. Primarily designed for 500 Watt Mazda C Lamp, but suitable for lower capacity lamps. Standard with glass or metal reflectors with convex, heat-resisting glass in door.

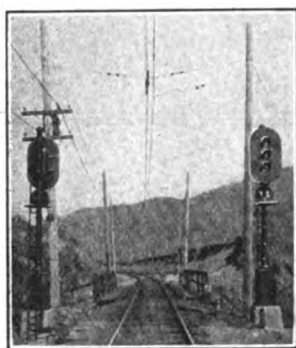
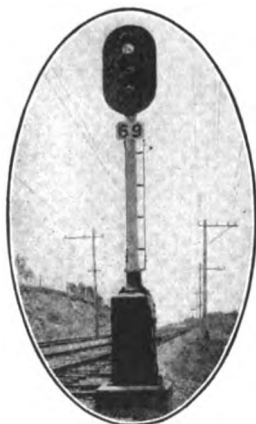
**Crouse-Hinds
Imperial Headlights
are sold exclusively by**



THE OHIO BRASS CO. Mansfield, Ohio, U.S.A.		NEW YORK — PHILADELPHIA — PITTSBURGH CHICAGO — CHARLESTON, W. VA. LOS ANGELES — SAN FRANCISCO — PARIS, FRANCE
TROLLEY MATERIAL—ELECTRIC RAILWAY CAR EQUIPMENT—RAIL BONDS—HIGH TENSION PORCELAIN INSULATORS—THIRD RAIL INSULATORS		



Illinois Traction Company

Public Service Railroad
of New JerseyPhiladelphia Rapid Transit
CompanyChicago, Milwaukee &
St. Paul RailwayWashington, Baltimore &
Annapolis Electric RailroadKansas City, Clay County
& St. Joseph Railway

Public Confidence

IS ASSURED to Railways equipped with Union Automatic Block Signaling Systems. Return on the investment is secured by the direct and indirect savings produced.

To be Complete—Safe, a signaling system must be based upon the sound principles of the Continuous Track Circuit, or in other words, a means must be provided whereby each car or train is responsible by its mere presence *anywhere* in the block or spacing section to *continuously* maintain one or more opposing stop signals in front of it as well as a stop signal behind it.

Local conditions govern each installation. Let one of our Engineers show you the benefits which Signals will produce for your Railway.

Union Switch & Signal Co.

SWISSVALE, PA.



Let us send you working plans with itemized costs and some interesting records of Twin Ties in actual use

Questions from Inquiries on Steel Twin Ties which are answered in our Folder on Steel Tie Construction:

How much concrete is placed underneath the bottom of the channels?

Is it customary to use Tie rods when a 7-in. grooved section is used?

Please send construction details and costs relating to concrete steel Tie construction.

I would be glad for you to submit information on itemized costs and track plans for Twin Tie construction.

We have about one-half mile of track on which we wish to use Steel Ties—how many will we require?

Will you, therefore, indicate on the enclosed print proper spacing of your Ties to make a perfectly secure job?

Please give us a quotation on approximately 800 Twin Ties complete with fastenings to be used with 75-lb. standard A.S.M.E. Rail in Pavement.

Without obligating us would be glad to consider your method of reconstruction on old concrete base.

**The International
Steel Tie Company**
Cleveland, Ohio

Canadian Representatives
**Sarnia Bridge Company,
Limited**
Sarnia, Ontario



Steel Twin Tie Track

"Straight" from the



Keystone Hunter Signs

"Advance agents" for your cars as they come down the street. Big, legible, striking attention getters.

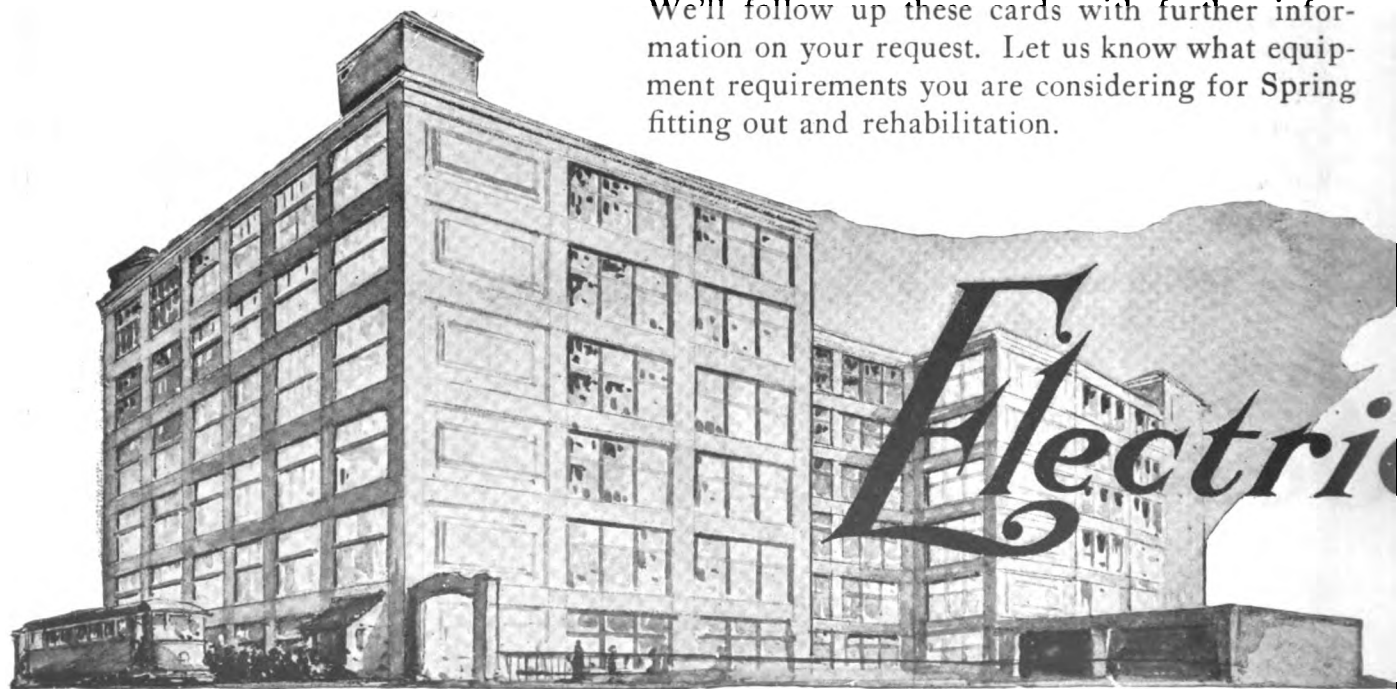
Faraday Signal Systems

Complete equipment, high or low voltage as desired. Bells, buzzers, and push buttons, mechanically strong and electrically perfect.

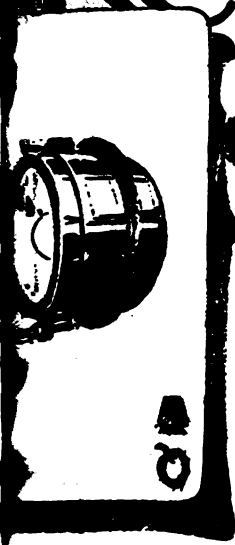
New Year cards from

More than merely seasonal greetings are offered here. These are concrete suggestions for 1924 selection. Many more will be found by reference to this 688-page book.

We'll follow up these cards with further information on your request. Let us know what equipment requirements you are considering for Spring fitting out and rehabilitation.



Keystone Line~



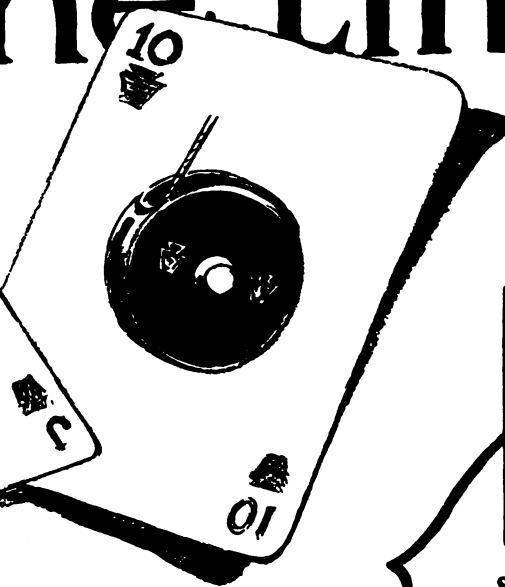
Golden Glow Headlights

Highly-luminous, non-dazzling equipment with the well-known characteristic soft yellow beam of light.



Gear Cases

Keystone Gear Cases are made of extra quality, soft, open hearth steel. Inter-changeable halves. Light, strong and durable.



Trolley Catchers

New Keystone type with reels of large rope capacity. All parts accessible, simple and rugged.

Some Other Keystone Specialties

Steel Gear Cases
Motormen's Seats
Lighting Fixtures
Headlight Resistances
Air Sanders
Trolley Catchers
Shelby Trolley Poles
Rotary Gongs
International Fare Registers
Fare Register Fittings
Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
Automatic Door Signals
Standard Trolley Harps
Standard Trolley Wheels
Segur Coil Winding Tools
Peerless Armature Machines
Insulating Materials
Aetna Commutator Stones
Sand Driers
Peerless Pinion Pullers
Employees' Badges
Line Material
Portable Lamp Guards



Essco Catalog No. 7

Remember that the Keystone Line covers track line and shop, as well as car equipment. The same reliability the same practical qualities and the same attractive basis of prices apply.

Time, worry and money can be saved by concentrating purchases in one long-established, well-known reputable house. Let 1924 be a Keystone year.

Service Supplies Co.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
829 Oliver Building

NEW YORK
50 Church St.

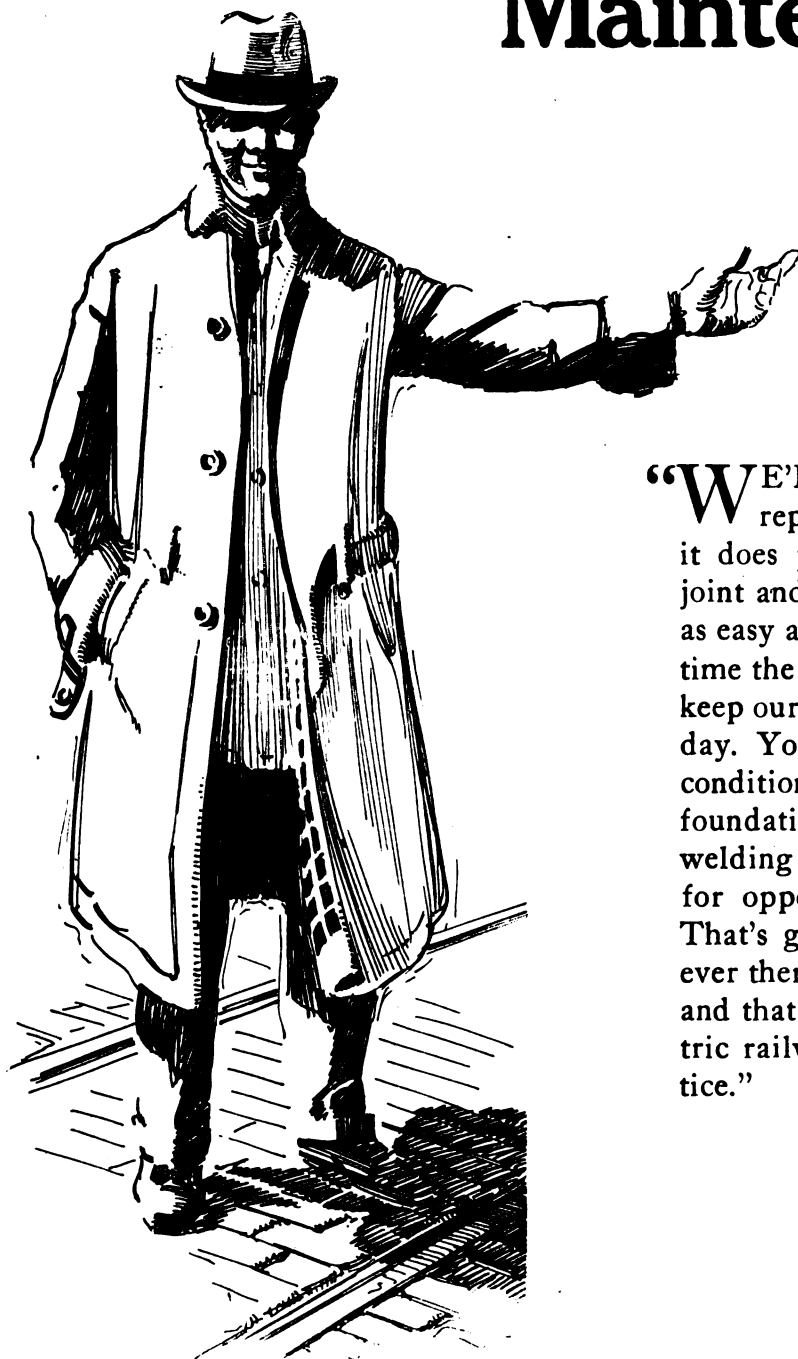
SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.

BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

"We're Cutting Next Spring's Maintenance Costs



"**W**E'RE not waiting for spring. We're repairing the bad spots now. Yes, sir, it does pay. It's easy to fix up every bad joint and all battered special work now—just as easy as it would be in spring. And by that time the damage would be a lot worse. So we keep our grinders and welders busy every open day. You know that keeping the rails in good condition is the best way of saving the track foundation. We don't wait until grinding and welding can't be put off any longer—we look for opportunities to do that kind of work. That's getting to be standard practice wherever there's anything short of polar weather—and that means on ninety per cent of the electric railway mileage. I'll say, it's good practice."

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

AGENTS:

Chester F. Gailor, 30 Church St., New York; Chas. N. Wood Co., Boston; Electrical Engineering & Mfg. Co., Pittsburgh; Atlas Railway Supply Co., Chicago; J. H. Doerr, Los Angeles; Equipment & Engineering Co., London.

This Winter"

and here's the Equipment for it

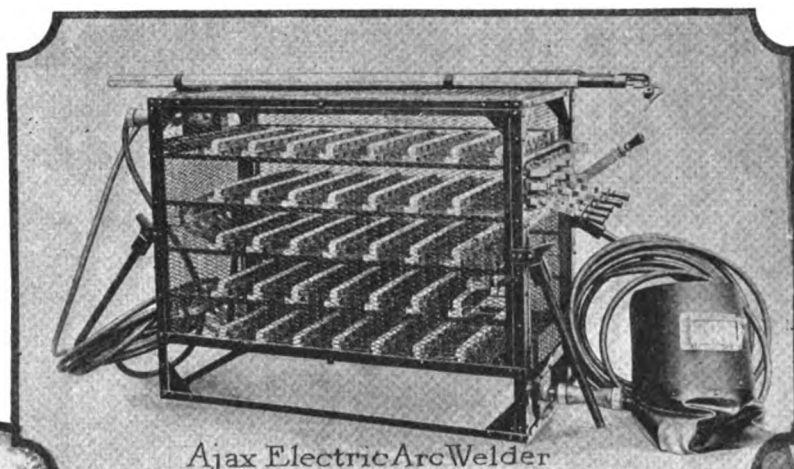
"AJAX!" The light weight, high-capacity, portable electric arc welder.

"ATLAS!" The high-speed, low-cost rotary grinder, invaluable for following up welding operations.

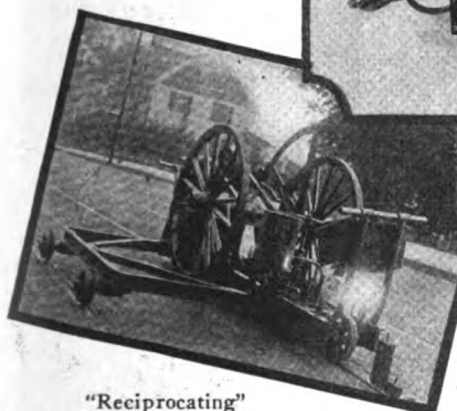
"UNIVERSAL!" The most complete, and generally useful, rotary track grinder available. We want to explain its peculiarly valuable features.

"RECIPROCATING!" The Old Reliable efficient machine for corrugation removal.

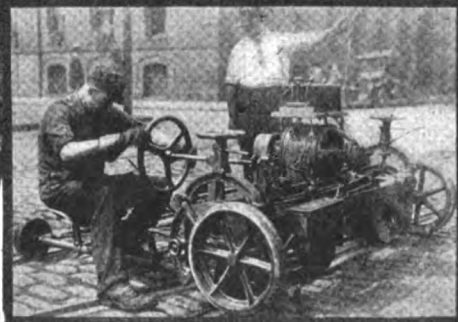
"HERCULES!" The radial swing-frame grinder that does anything a flexible shaft outfit can do but eliminates the disadvantages of that type. Grinds at any angle, light, quick-portable, sturdy, moderately priced.



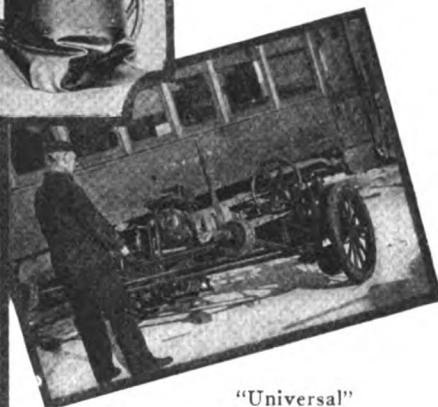
Ajax Electric Arc Welder



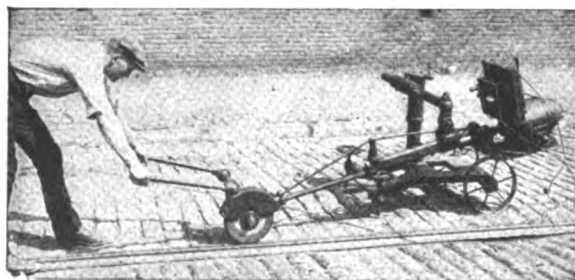
"Reciprocating"



"Atlas"



"Universal"



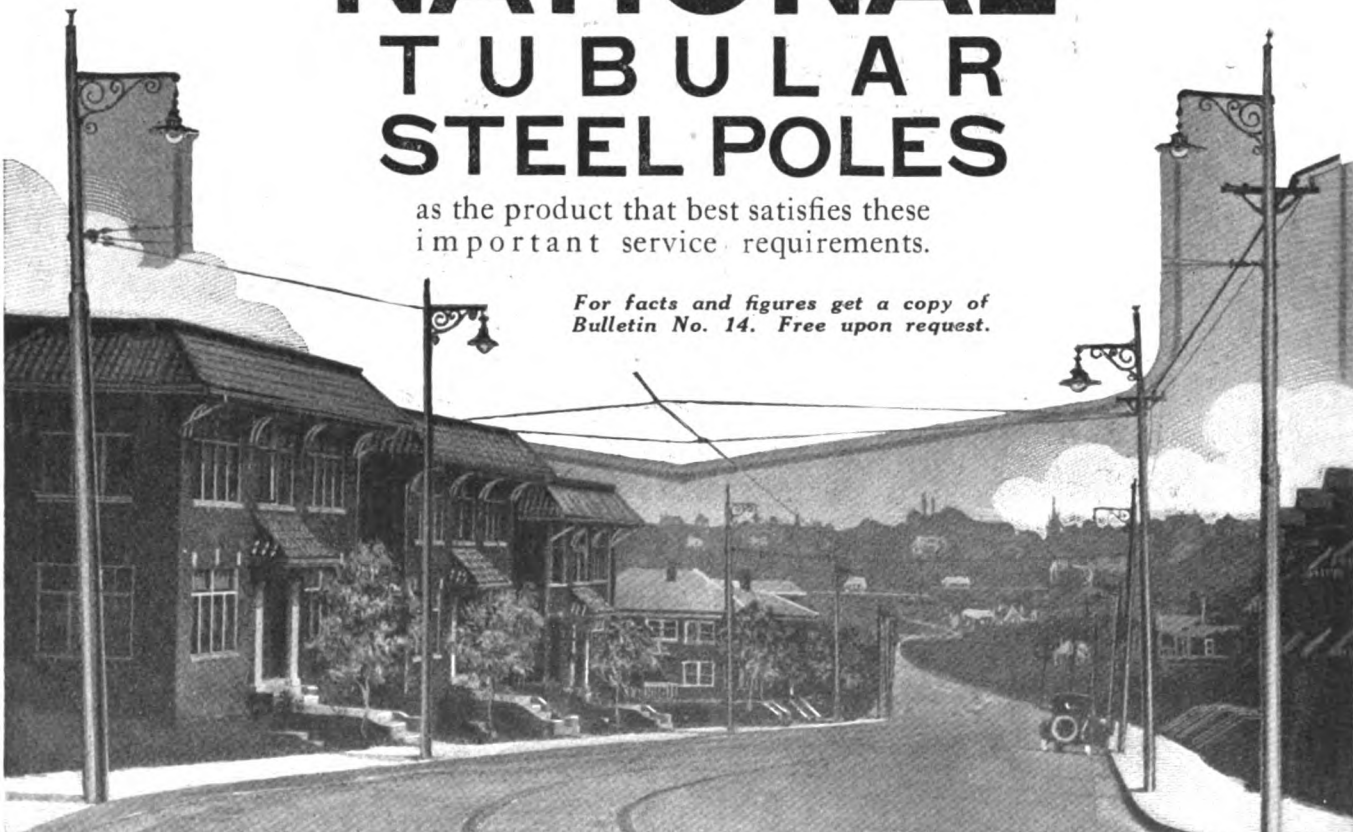
"Hercules"

C o n s i d e r a t i o n s o f **SAFETY LONG LIFE** *a n d* **ECONOMY** *Usually Point to*

"NATIONAL" TUBULAR STEEL POLES

as the product that best satisfies these
important service requirements.

*For facts and figures get a copy of
Bulletin No. 14. Free upon request.*



NATIONAL TUBE COMPANY, PITTSBURGH, PA.

GENERAL SALES OFFICES: FRICK BUILDING

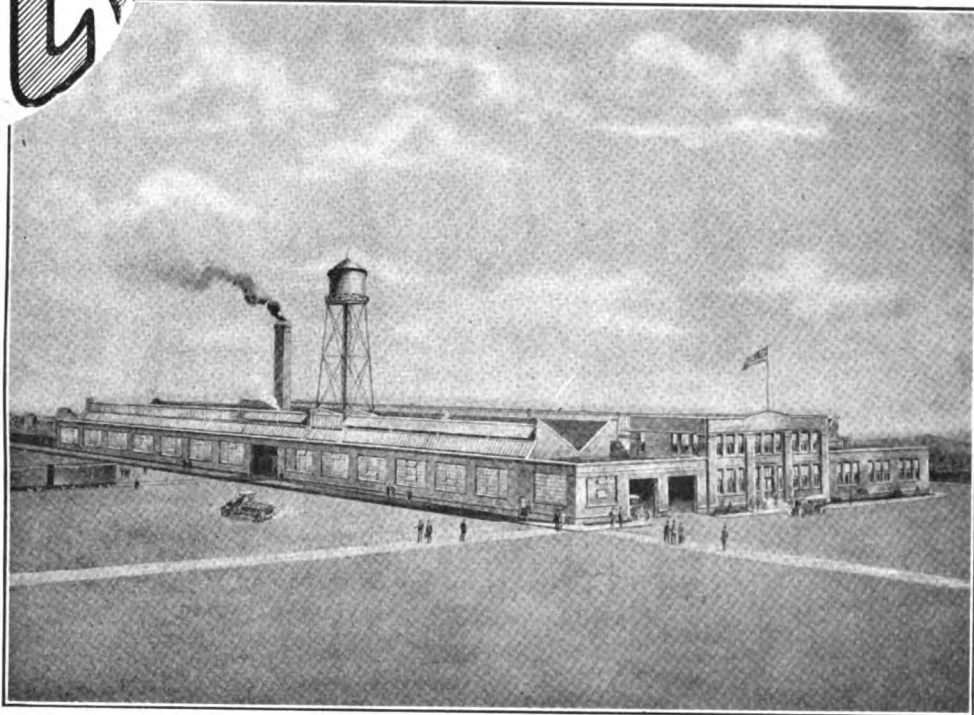
DISTRICT SALES OFFICES

Atlanta Boston Chicago Denver Detroit New Orleans New York Salt Lake City Philadelphia Pittsburgh St. Louis St. Paul
Pacific Coast Representatives: U. S. Steel Products Co. San Francisco Los Angeles Portland Seattle
Export Representatives: U. S. Steel Products Co. New York City

Let this be your manufacturing plant

Why attempt to make your own equipment in shops already busy with more important maintenance work? Why try to manufacture stuff without the proper tools and machinery? Why do experimental work that has already been done for you? There's no saving in that.

Here is a plant, properly equipped, operating on an economical production basis, turning out equipment of established merit, equipment which is time-tried and proved in actual railway service.



NATIONAL PNEUMATIC EQUIPMENT

DOOR ENGINES
DOOR AND STEP
CONTROL
OPERATING
MECHANISMS
MOTORMAN'S
SIGNAL LIGHTS

See Catalog No. 3

This beautifully-bound, copiously illustrated book describes, in detail, these devices and their application. Ask for copy.

NATIONAL PNEUMATIC COMPANY, Inc.

50 Church Street, New York

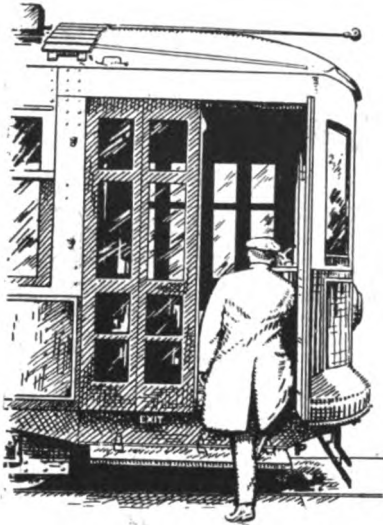
Colonial Trust Bldg., Philadelphia

Works: Rahway, N. J.

Dominion Wheel & Foundries, Ltd., Toronto, Ont.

McCormick Bldg., Chicago

INDEPENDENT DOOR CONTROL



Showing Correct and Convenient Method of Passenger Interchange with Independent Door Control as Provided by the New SELECTOR VALVE.

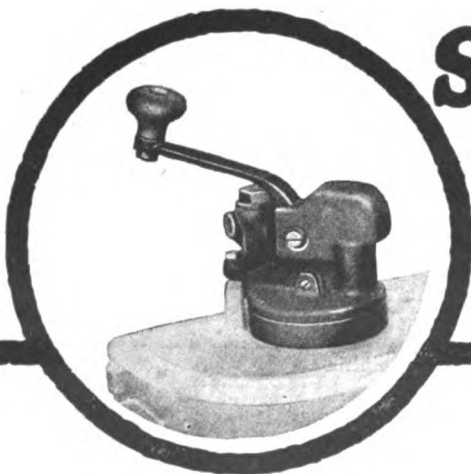
Protection in Winter!

Independent control of double-passage doors on Safety Cars is extremely desirable in winter.

When stops are made for passengers moving in but one direction, only one door need be used; the other door, remaining closed, protects those inside from undue draft.

Aside from adding to passenger comfort and satisfaction, the power required for adequate heating is materially reduced.

The Door Selector Valve is the simplest and most practical means of securing independent door control. Let us show you how easily it can be adapted to your needs.



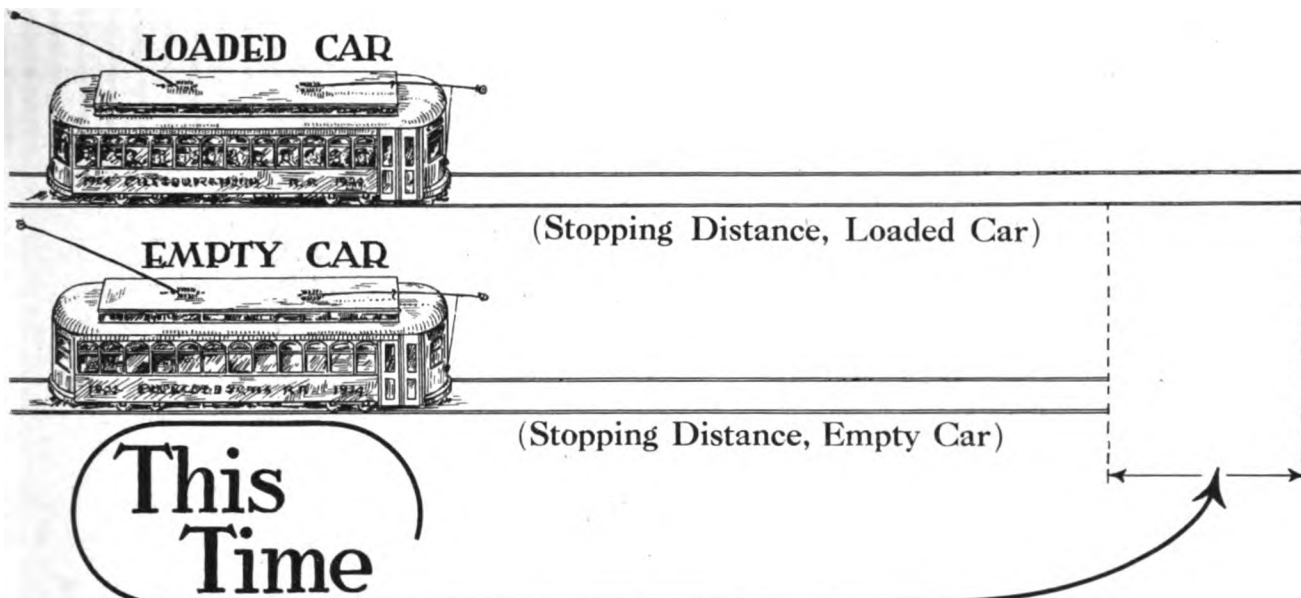
SAFETY CAR DEVICES CO.

OF ST. LOUIS, MO.

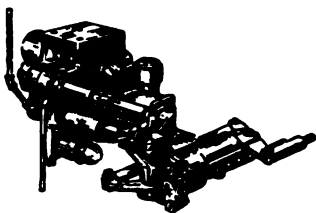
Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

We furnish the Air Brake and Safety Car Control Equipment which *makes* the Safety Car



Can be Saved



THE VARIABLE LOAD BRAKE

The Westinghouse Variable Load Brake has been developed to solve the problem of controlling cars under widely varying load conditions. It is an attachment which may be added to any straight air or semi-automatic equipment whereby the braking force is automatically adjusted to suit the weight on the car, by regulating the brake cylinder pressure as the weight changes.

The adjusting mechanism is thrown into engagement by the opening of the car doors. While the doors are open, passengers are leaving and entering the car, and when the doors are closed again, the condition of loading will be that under which brake operation will take place for the next stop, or a slow-down, as the occasion may demand.

The use of the brake insures stopping within a uniform distance regardless of whether the car is empty or loaded.

THE above illustration shows the approximate difference in stopping distance, or *time*, between empty and loaded cars with *ordinary brakes*. The Westinghouse Variable Load Brake eliminates this difference, insuring a uniform stopping distance regardless of whether the car is empty or loaded!

Consider the saving this means in terms of time, the possibilities offered for speeding up car schedules through congested districts, increasing car mileage and car earning ability.

An additional factor of safety is also gained, and that, coupled with the time-saving feature, makes the Variable Load Brake at the present time one of the most widely discussed innovations in the electric railway field.

Send for Publication T-2045

WESTINGHOUSE TRACTION BRAKE CO.
General Office and Works, WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES



SANGAMO ECONOMY METERS *with car inspection dials*

Save power at the car, save labor at the car house! Equip every car on your lines with this rugged, energy-saving device and you will induce savings of from $\frac{1}{3}$ to $\frac{1}{2}$ a cent per car mile.

Whether you are operating one car or three thousand, it will pay you to investigate. Nearly one hundred and fifty properties in the United States have already standardized on Economy Meters. They have found their records of high value for managerial and engineering purposes.

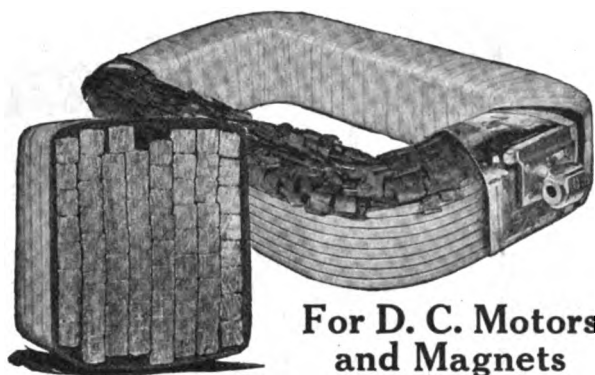
METER THE ENERGY

That's what you want to save

ECONOMY ELE

L. E. GOULD, President
General Sales Agents

Sangamo Economy Meters—The Aluminum Field Coil



For D. C. Motors
and Magnets

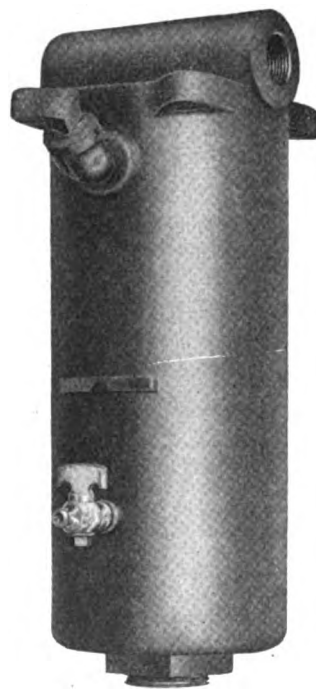
THE ALUMINUM FIELD COIL

Not only has The Aluminum Field Coil chopped from 600 to 1600 pounds off the weight of the car, but it has minimized troubles from internal shorts.

The insulation is permanent—it is an integral part of the coil itself and it is not broken down by heat or moisture.

The Aluminum Field Coils are doubly protected against external failures—after being dipped and baked they are wrapped with webbing, oiled bias tape and again with webbing—they are then dipped and baked once more in insulating varnish.

More than 74 electric railways in the United States are now successfully using them. Let us quote you prices and answer detailed questions.



AIR RECTIFIER

Eliminates frozen air

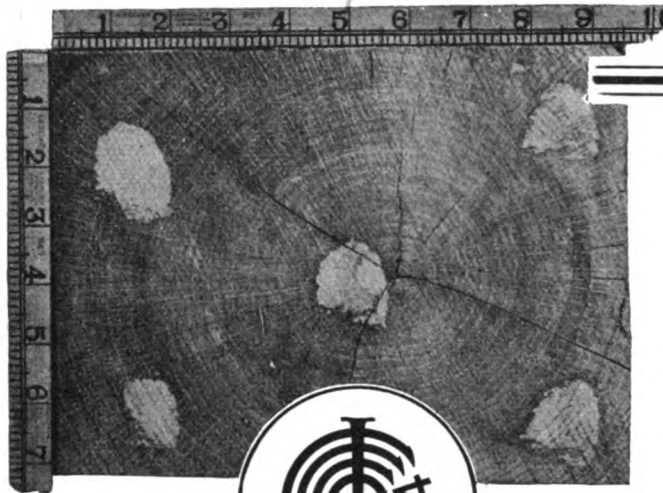
If you have ever had trouble from "frozen air," let us show you how this simple device will eliminate that trouble. The Air Rectifier automatically mixes alcohol and its vapor with the water and the air, lowering the freezing point so that the air can expel the water from the system. It holds 3 pints, sufficient for 90 days' operation. Hundreds of cars now equipped. Let us explain the operation and advantages of this device.

RIC DEVICES CO.

1592 Old Colony Bldg., Chicago, Ill.

District Agents For
Peter Smith Heaters
Wood Fare Boxes
Bemis Boyerized Truck Specialties
Miller Trolley Shoes

The Thoroughness and Progressiveness of *International* Production and Treatment Put It In a Distinctive Class



YOU may even say that International is in a class by itself, after you have investigated International methods. The policy under which this organization is operating and the methods of production, inspection, grading, marking, seasoning and treatment are so different from those commonly prevailing in the tie field, as to place International in a distinctive class.

The feature of most vital importance to the railroads at this time is the strict enforcement of the specifications made standard by the American Railway Engineering Association. Only through the enforcement of these specifications can a road be protected against receiving ties of uncertain size and grade. The International tie production policy therefore is based on the enforcement of these specifications.

The grade is plainly marked on each end of every tie—five dots indicating a grade 5 tie, four dots a grade 4 tie, and so on. Under this system there is no real need for a road to send buyers and inspectors into the producing territory—the finished ties are laid down on your track, exactly where and when you want to use them.

The crowning feature of International's progressiveness is the placing of the I. C. C. Co. dating nail (the date in actual figures) in every tie as a permanent identification mark by means of which you can ascertain the character of service given by any International tie at any time in the future.

We invite your inquiries and personal investigation.

International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants—Texarkana, Texas

Beaumont, Texas Galveston, Texas



1927	1923	1922	MILWAUKEE ELEC. RY. & LT.	1923
1915	1922	1922	CLEVELAND RAILWAY CO.	
1917	1920		BOSTON ELEVATED RAILWAY CO.	
1921	1922		TORONTO TRANSPORTATION COMMISSION.	
1927 (6 IN MAY - 8 IN NOVEMBER)			UNITED RY'S. & ELEC. CO. of BALTIMORE	
1922			DETROIT UNITED RAILWAY	
1922	1922	1923	PITTSBURGH RAILWAYS CO.	
1917			CHICAGO SURFACE LINES.	
1922			WHEELING TRACTION COMPANY.	
1922		1923	NEW ORLEANS PUBLIC SERVICE, INC.	
1917	1919	1922	READING TRANSIT & LIGHT CO.	
1919	1922		DALLAS RAILWAY CO.	
1916			NEW YORK STATE RY'S. of ROCHESTER.	
1917			NORTHERN OHIO TRACTION & LT. CO.	
1917		1923	SPRINGFIELD ST RY CO (MASS.) (WORCESTER)	
1922			COMMUNITY TRACTION CO. of TOLEDO.	
1922		1923	THE KANSAS CITY RY'S. CO.	
1922			LOUISVILLE RAILWAYS CO.	
1915	1917	1923	STUEBENVILLE, EAST LIVERPOOL & BEAVER VALLEY TRAC. CO.	
1917			HOLYOKE STREET RY. CO.	
1917			DUQUESNE LIGHT CO.	
1919			UNITED RY'S. CO. of ST. LOUIS	
1921			CINCINNATI TRACTION CO.	
1922			UNITED ELEC. RY'S. CO. of PROVIDENCE.	
1922			TORONTO & YORK RADIAL RY. CO.	
1916			THIRD AVE. RY. CO.	
1916			TRI-CITY RY. & LT. CO. of DAVENPORT, IA.	
1916			RICHMOND LT. & R.R. CO.	
1916			YORK RY'S. CO.	
1917			ACME POWER CO.	
1919			CRYSTAL LAKE STONE CO.	
1921			GEORGIA RY. & PWR. CO.	
1920			JOHN HOLDEN COAL CO. (SCRANTON RY CO.)	
1921			LEHIGH VALLEY TR. CO.	
1921			TIFFIN, FOSTORIA & EASTERN EL. RY. CO.	
1922			EAST ST. LOUIS & SUBURBAN RY. CO.	
	1923		MARKET STREET RY CO	
	1923		DES MOINES CITY RY. CO	
	1923		NEW SO WALES GOVT RY. & TR CO.	
	1923		OHIO VALLEY ELEC. RY. CO.	
	1923		BIRMINGHAM RY., LT., & PWR. CO	
	1923		CITY OF DETROIT	
	1923		INDIANA SERVICE CORP	
	1923		PHILADELPHIA RAPID TR CO	

Statistical record of DIFFERENTIAL CARS

(in graphic form)

Shows name of company, number of cars and years in which they were purchased.

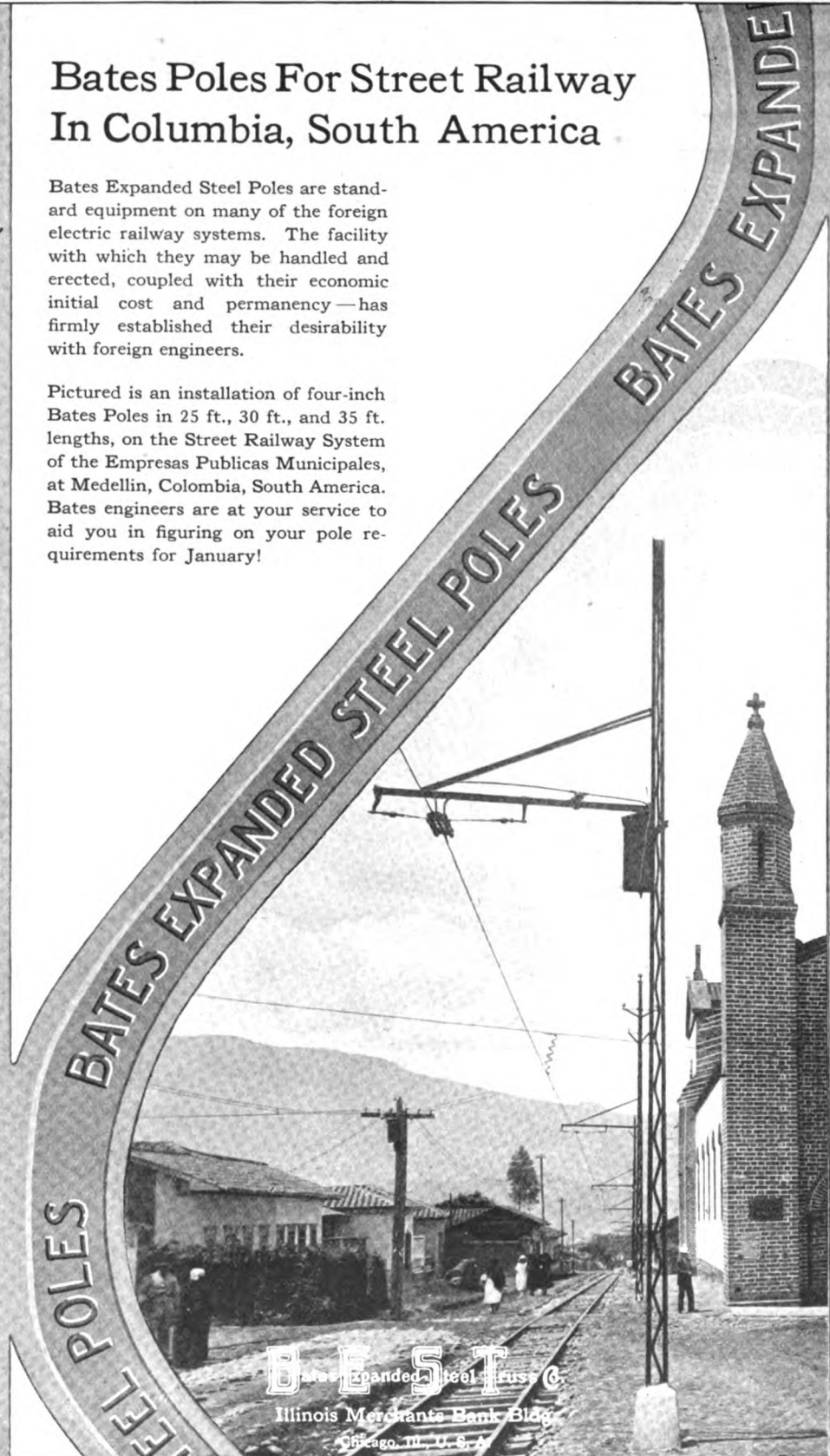
Note particularly the number of repeat orders.

The Differential Steel Car Company
Findlay, Ohio, U. S. A.

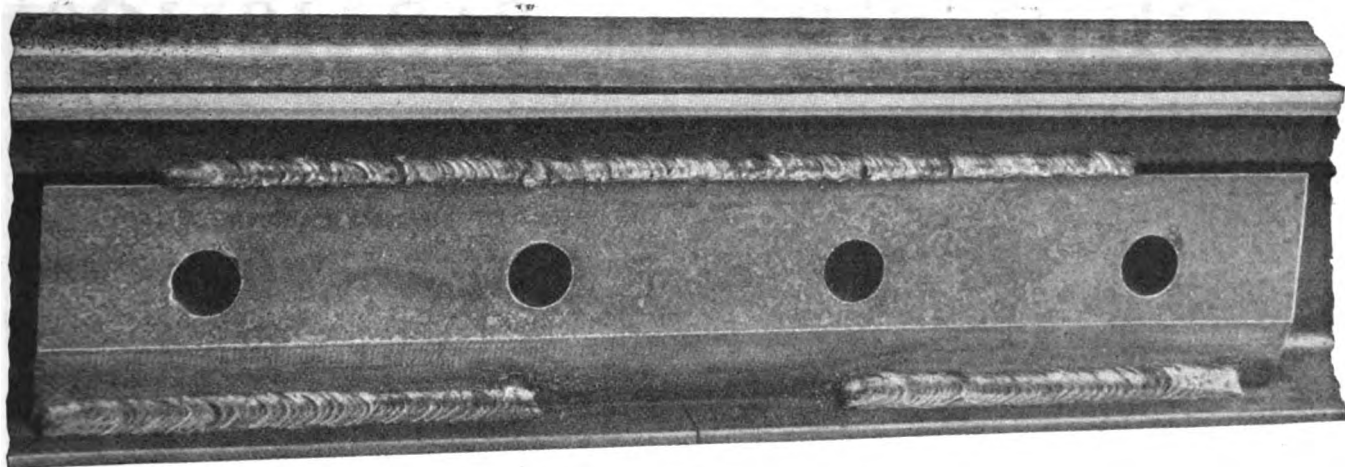
Bates Poles For Street Railway In Columbia, South America

Bates Expanded Steel Poles are standard equipment on many of the foreign electric railway systems. The facility with which they may be handled and erected, coupled with their economic initial cost and permanency—has firmly established their desirability with foreign engineers.

Pictured is an installation of four-inch Bates Poles in 25 ft., 30 ft., and 35 ft. lengths, on the Street Railway System of the Empresas Publicas Municipales, at Medellin, Colombia, South America. Bates engineers are at your service to aid you in figuring on your pole requirements for January!



BATES ONE PIECE **EXPANDED** **STEEL POLES**



What This Important Development Means to Electric Railways

Back of UNA Joints is an interesting history. It covers years of the most exhaustive scientific investigation of seam welded joints. Throughout the undertaking, laboratory research and recommendations were combined with practical engineering and the consulting advice of some of the most prominent electric railway engineers in this country.

UNA Joints

(Patented)

Three main objectives were foremost in the minds of the investigators.

- 1st. To preserve the inherent practical advantages of seam welded joints and to continue to make the complete installation practical from the standpoint of the way engineer.
- 2nd. To maintain the low initial installation cost which has always been characteristic of seam welded joints.
- 3rd. To make the life of the joint approximate that of the rails themselves, thereby increasing the life of the track and reducing to a minimum that heavy cost item "track maintenance."

A true realization of these important qualifications is found in UNA Joints. They represent a definite and sure means of securing permanent track construction in a practical manner and at moderate cost. The installation of UNA Joints applies not only to new track but also to old track, where they will bring added years of service and put off the day when new track must be purchased.

In these various ways UNA Joints offer to electric railways an investment possessing great value as years go by.

Send for a copy of "Investigation of Seam Welded Rail Joints"

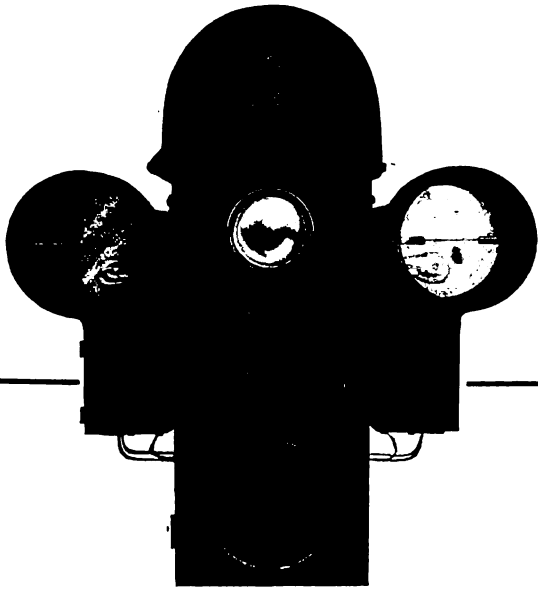
Rail Welding & Bonding Company, Cleveland, Ohio

Manufacturers of

UNA Bonds

Some signal statistics

*An average of
13,393 O. K. operations
per signal failures—on
one U.S. Signal equipped road*



Type K-2 U.S. ELECTRIC SIGNAL

Duplicate indications eliminate danger from mechanical or electrical failures—

Even if one lamp burns out, or one indication fails, another set will function. There are duplicate lamps for visual signals, one held in reserve by means of a pick-up magnet, thus insuring certainty of operation. The *double-stop* indication—red light for night and red disc for daytime, both operating simultaneously, make observation certain. This K-2 type of signal is "neutral," i.e. gives no indication when no cars are in the block. It gives a positive visual "proceed" indication to each car entering the block, and sets a positive "danger" signal at the other end.

And these figures included failures from all extraneous sources, crossed wires, lightning, etc. Although the U. S. Electric Signals in this case had seen over ten years service, they still function with remarkable reliability, both mechanically and electrically.

These are some of the many roads using U. S. Signals with safety and satisfaction.

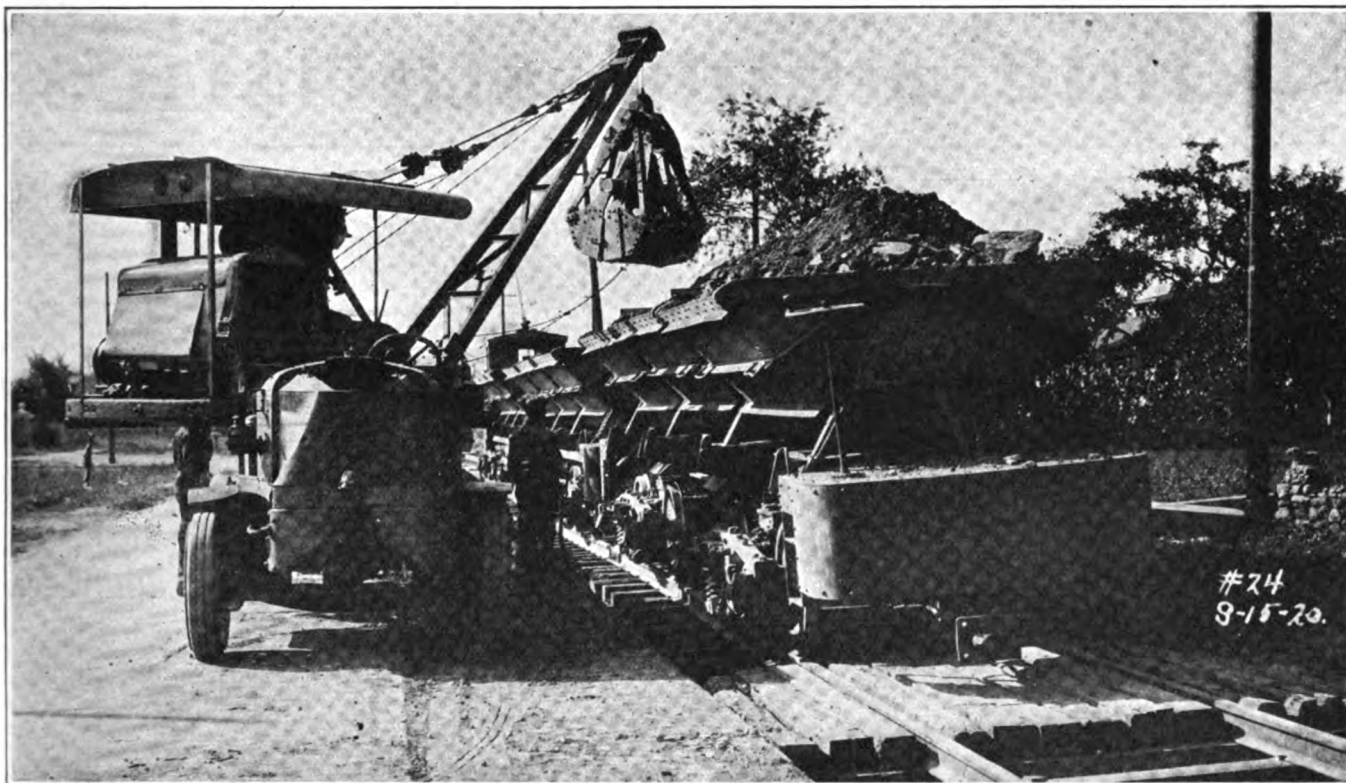
Connecticut Co.
Public Service. of New Jersey.
Rio De Janeiro Tramway Light
& Power Co., Brazil.
City of Detroit.
Portland Ry. Lt. & Pwr. Co.
Tacoma Ry. & Pwr. Co., Wash.
Tampa Electric Co., Florida.
Birmingham Ry. Lt. & Pwr. Co.,
Alabama.

United States Electric Signal Co. West Newton, Mass.

REPRESENTATIVES:

Western: Frank F. Bodler, Monadnock Bldg., San Francisco, Calif.
Foreign: Forest City Electric Service Supply Co., Manchester, Eng.





Better Than a Wall Street Bull for Boosting Street Railway Stock

A Universal Crane mounted on a motor truck boosts street railway stock in the REAL Wall Street—the street where the railway runs. Boosts the stock by increasing the value of such property. Increases the value by reducing construction and repair costs. Reduces construction and repair costs by saving labor, eliminating interruptions to service, shortening the time it takes to complete a job, and by the speed with which it travels from job to job.

Work cars carrying cranes have to use the tracks that passenger cars need. Universals take short cuts to the job—and leave the tracks clear for traffic. Street railways are

using them for laying and handling track work at intersections, loading excavated material on track replacements or extensions, placing poles, handling ballast in yards, and for replacing large gangs of men by handling all heavy lifts in the field.

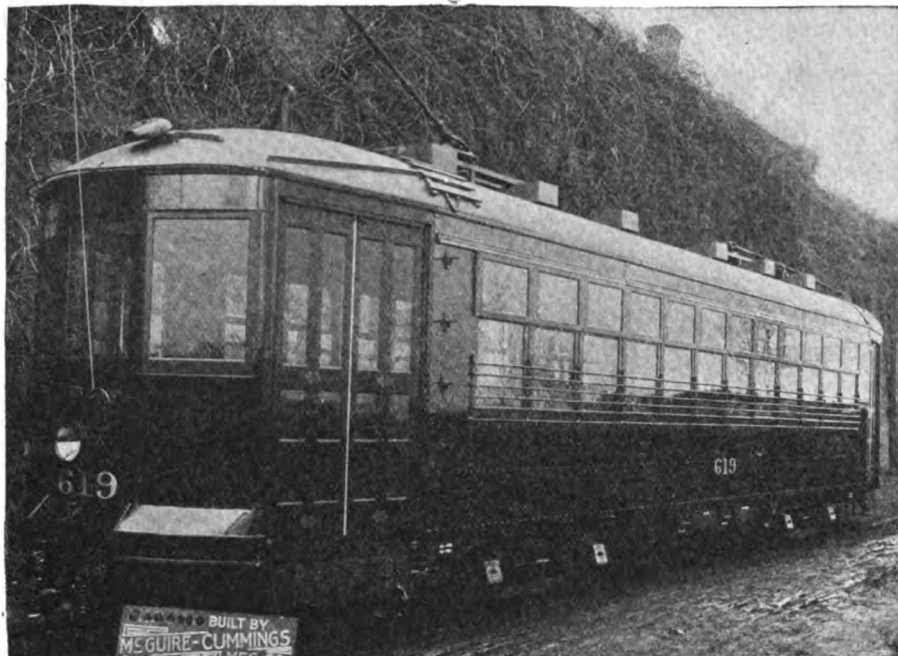
The motor truck mounting is more generally preferred, but Universals are adapted to all types of mounting including railroad flat cars. They are full revolving and require no outriggers.

For more complete information write for Bulletin 22-6.

The UNIVERSAL CRANE CO.
1176 Swetland Bldg. Cleveland, Ohio
Branch Offices in Principal Cities



McGuire-Cummings Manufacturing Co.



*Multiple-unit-control double-truck passenger car for two-man operation—
Built for Georgia Ry. & Power Co., Atlanta.*

The above shows type of cars built for the Georgia Railway & Power Co. of Atlanta. Succeeding advertisements will feature cars of the following types recently built by us.

- | | |
|--|--|
| <p>1. Light-weight, Double-truck Cars
One-man-two-man operation. Built for Des Moines City Railway Co., Des Moines, Iowa.</p> <p>2. Safety Cars for One-man Operation
With double doors. Built for Gary Street Railway Co., Gary, Ind.</p> | <p>3. Center Entrance Cars
(Peter Witt type.)
Built for the City of Detroit.</p> <p>4. Light-weight Suburban Cars
Built for Chicago & West Towns Railway Co.</p> |
|--|--|

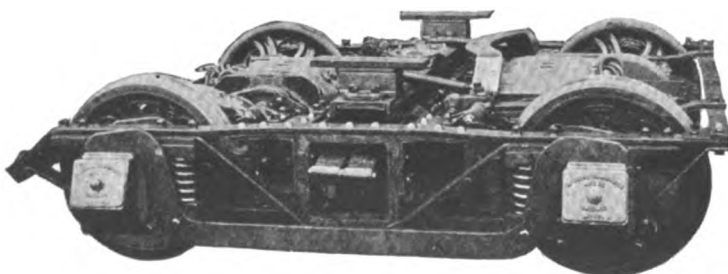
Our engineering department is at your service. We will be pleased to either submit specifications and drawings and to quote prices thereon, or we will submit proposals on specifications furnished.

McGuire-Cummings Manufacturing Co.

General Offices

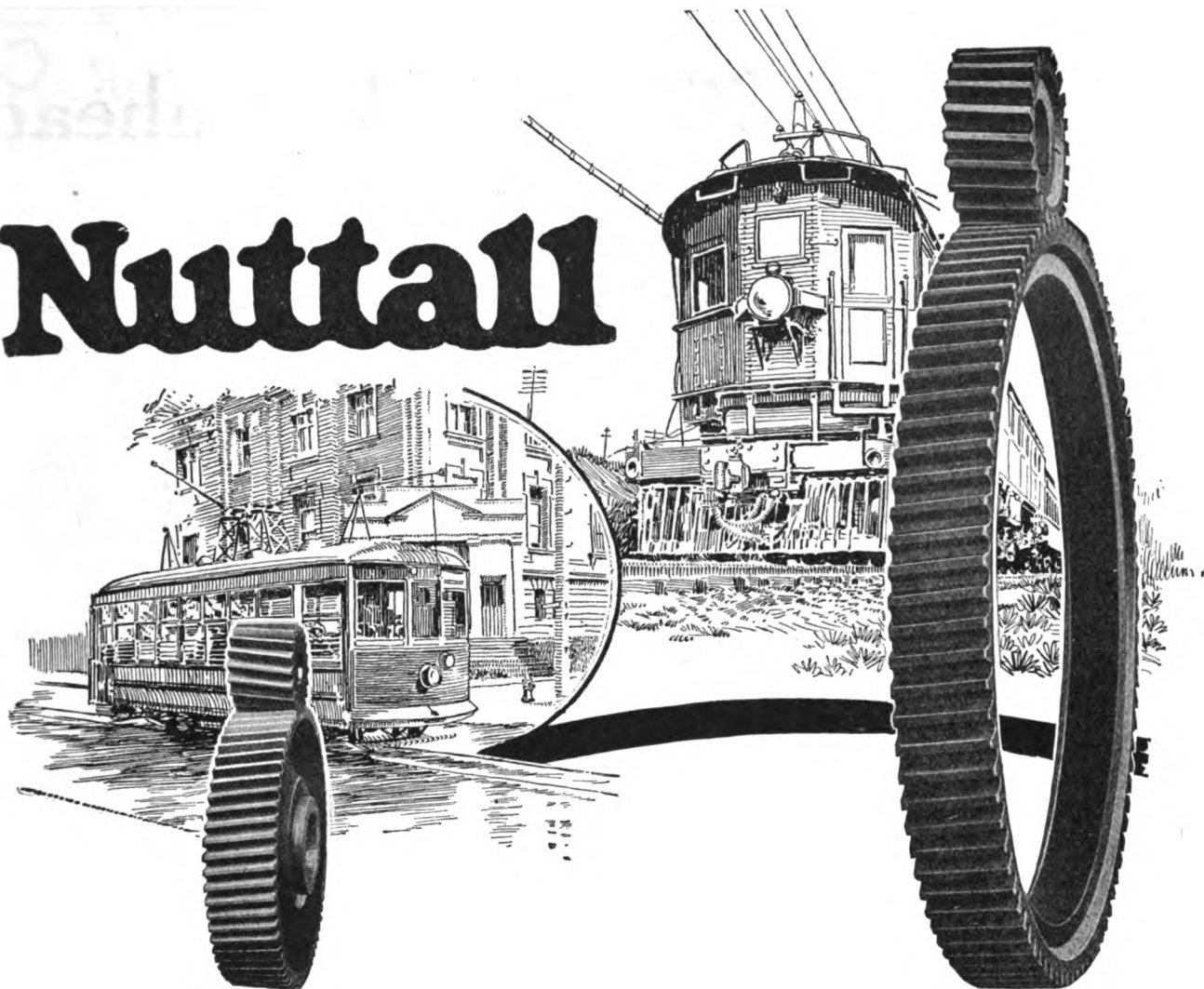
111 W. Monroe St., CHICAGO, Ill.

**McGuire-Cummings
No. 62 motor truck
for low car body
for city service**



**Inside hung
brake equalizer
design, 26-inch
wheels**

Nuttall



There is a tried and proven Nuttall Gear for every class of electric traction service, light or heavy, high speed interurban, or city runs, freight, passenger, express.

Nuttall Engineers will regard it as a pleasure to consult you about your requirements, and help you adopt a Nuttall Standard, avoiding the expense of special designs.

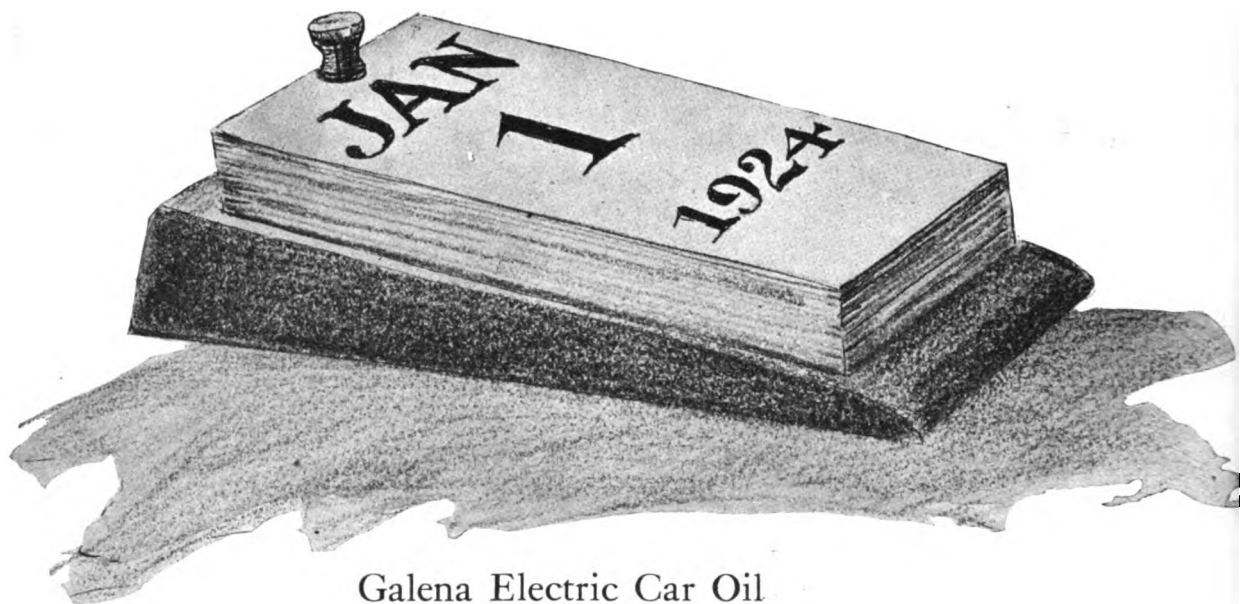


R. D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA

All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for Nuttall Electric Railway and Mine Haulage Products.

In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

366 new days ahead—



Galena Electric Car Oil
Galena Power House Valve Oil
Galena Power House Engine Oil
Galena Air Compressor Oils
Galena Turbine and Dynamo Oils
Galena Perfection Compound
Galena Lubricating Greases

A time-tried and service-tested Galena Oil or Grease for every motion or bearing part in electric railway service.

The proof of an oil is on the



GALENA-SIGNAL

New York

Franklin,

and offices in all

Leap year and a proposal for better lubrication

Back in the early days of civilization men hailed the New Year with great hope and rejoicing. Roman citizens went en masse to present gifts to their emperor; and to pray for good fortune in the days to come.

And today every business man turns over an imaginary new leaf at the end of the year. Each New Year finds him with a host of resolutions and plans to make it a "bumper."

Well, here's a proposal! Let Galena Service Engineers shoulder the responsibility of *correct lubrication* on your property in 1924.

And by *correct lubrication* we mean more than just the supply of oils. We mean the supply of Galena oils which, by their inherent good quality and precise adaptation to each particular need, ensure the utmost in lubricating efficiency per dollar expended.

They may cost a little more in the first place, than oils manufactured from lower grade crudes with less painstaking thoroughness.

But when you come to compare the service value of Galena Oils with that of the cheaper grades—when you figure in repair costs; mileage; and maintenance, then their true economy becomes very evident.

A Resolution

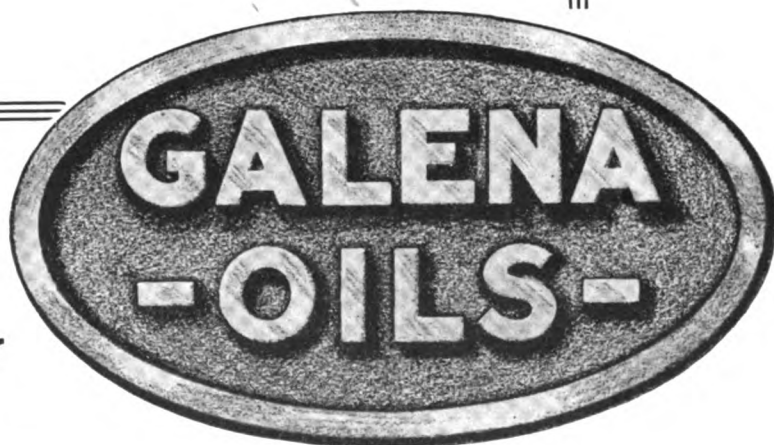
To put lubrication problems up to Galena Service Engineers and be assured of maximum operating efficiency.

maintenance sheet

OIL COMPANY

Chicago

principal cities





ENGINEERING

Turbines

Developments during the year on large turbines consisted of refinement in mechanical details without radical changes in construction. The outstanding features were the production of turbines for high steam conditions and the production of turbines in unprecedented volume.

Shipments for 1923, exclusive of turbines for mechanical drive and ship propulsion, had a total capacity of approximately 1,660,000 kw.

Supercharger

A new turbine supercharger for airplanes was designed and built specifically for extreme altitude operation. It is rated to feed sea-level atmospheric pressure to the engine at a height of 35,000 ft., or about twice the rating of the one used in the previous American altitude record flight.

Electric Propulsion

Diesel-electric propelling equipments were adopted for two ships of a new type, built for canal, river, lake and coastwise service. At the close of the year there were G-E electric propelling equipments completed or under construction for 14 ships, making the aggregate rating of this class of machinery, from 1908 to date, more than 550,000 shaft h.p. for 45 ships.

Electric Railways

As in the preceding year the more important additions to main line electrification occurred in foreign countries, and it is noteworthy that in a majority of cases the 3000-volt direct-current system was adopted.

Progress included the initial operation of 3000-volt equipment on the Spanish Northern Railway in Spain and the completion and test of ten 150-ton, 3000-volt locomotives for the Mexican Railway Company, Ltd. Two more 66-ton d-c. locomotives were placed in service by the Japanese Imperial Government Railways.

Automatic Railway Substations

The use of automatic substations continued to be popular with electric railways. At the close of the year there were 70 railway companies using G-E Automatic Substations with 225 equipments aggregating more than 170,000 kw. capacity either in service or under

construction. Thirteen railways were using equipments with capacities of 4000 kw. and above.

Automatic Stations

The largest single-unit automatic hydro-electric station in the world is being installed by the Adirondack Power & Light Corporation for their Sprite Creek Development near Little Falls, N. Y. It is rated 7500 kv-a., 6000-volt, 3-phase, 60-cycle, the largest previous equipment of this type being of 5000 kv-a. capacity.

Waterwheel Generators

The first of the two 65,000-kv-a. waterwheel generators for the Niagara Falls Power Company was completed and shipped in sections to the power site for assembly. It is the largest machine of its type, both in capacity and physical dimensions, so far constructed.

Frequency Converters

A frequency converter of exceptional capacity and unusual characteristics was constructed for tying together the 25- and 60-cycle systems of the United Electric Light & Power and the New York Edison Companies.

Switching Apparatus

The developments in switching apparatus consisted largely in the improvement of existing designs rather than in bringing out strictly new types of apparatus. Both horizontal and vertical isolated phase arrangements were worked out in detail for several important installations and the application of breakers to removable trucks was extended to include motor-operated breakers with separating chambers.

Relays

A new type of induction overload relay has as an outstanding feature a target which is "built in" the relay and indicates when the relay has functioned to trip the particular circuit which it controls.

Transformers

The recent tendency to concentrate the transformation of electrical energy in units of increasing capacity was evidenced by the construction of a large number of transformers of record size. A notable event of the

year was the placing in service of the 220,000-volt units at Power House No. 8 of the Southern California Edison Company's system.

Induction Voltage Regulators

A new design single-phase induction voltage regulator was developed, which embodies a number of improvements as compared with previous types. In addition to improving the voltage regulation by a more rapid correction of voltage changes, it utilizes a tank which is highly resistant to rupture as a result of explosions, and a rigid internal mechanical structure to minimize noise during operation.

Lightning Generator

The lightning generator installed in the High Voltage Laboratory of the Pittsfield Works will produce voltages of approximately 2,000,000 above ground. This is perhaps higher than lightning voltages that are usually produced on transmission lines.

Lightning Arresters

A new type of oxide film arrester, known as the pellet arrester, was developed commercially.

X-Ray Tubes

A new tube having 15 times the X-ray energy of the average tube now in commercial use, was produced for therapeutic work.

It is rated 250,000 volts, 50 milliamperes, and is provided with cooling coils which carry the circulating water direct to the back surface of the anode.

Electrically Operated Flow Meters

A G-E electrically operated flow meter with many new characteristics was developed for accurately measuring the total flow of steam, water, air, gas, oil, etc., through pipes. It does not supersede the G-E mechanically operated flow meter.

Industrial Motors

A new single-phase motor which operates on the squirrel cage induction principle was developed which eliminates entirely the short circuiting switches heretofore considered essential and permits the simplest possible construction.

GENERAL

DEVELOPMENTS 1923

Industrial Motor Control

A number of improvements were made in the apparatus designed for the control of industrial motors, which, despite the relatively small size of the individual controllers, are of great economic value due to the vast extent of the field of present day industrial motor application.

An ingenious design of a magnetic switch, provided with a thermal overload relay, was developed to meet the demand for starters of compact construction and for mounting in the frames of machines.

Motor Applications

To meet the requirements of the Russian Government in regard to electrical equipment for oil well drilling, two totally enclosed induction motors were developed rated 75 h.p. and 50 h.p., 750 r.p.m., with a temperature rise of 45 deg. C. These motors are unique in that they are the largest totally enclosed, self-ventilated motors yet manufactured, previous designs in these sizes having employed water for cooling.

Steel Mills

There was added to the existing main roll drives, 300-h.p. and over, 44,100 h.p. (normal continuous rating) bringing the total to 612,110 h.p. The tendency towards the use of high-speed motors with reduction gears which has been quite marked for the last few years continued to gain headway and over 90 per cent of the new motors were for geared drive.

One of the most important developments of the year was the building of alternating-current brush-shifting motors with shunt characteristics.

Electric Welding

The most important achievement in arc welding was a radical improvement in the construction of the electrode. As the result of exhaustive research and experiment, a mechanical construction was developed which makes it easy to combine the desired welding flux within the body of the electrode.

Induction Furnaces

Fifteen 75-kw., 1200-lb. induction furnaces were placed in commercial operation in 1923 for melting non-

ferrous metals, and a number of additional units were under construction.

A notable accomplishment of the repulsion-induction furnace was the successful melting of pure copper on a commercial basis.

Industrial Heating

A special furnace was developed for annealing steel punchings used for field and armature laminations. It is built 6 ft. above the floor on a structural steel support, and the laminations are placed on a car which is rolled under the furnace and raised into the heating chamber on a hydraulic platform.

Battery Chargers

A new constant potential motor-generator $7\frac{1}{2}/15$ -volt battery charging outfit was produced, which includes a special regulator to maintain the voltage constant at the busbars, regardless of the number of batteries being charged.

Photo Electric Cell

An extremely sensitive photo electric cell was developed, consisting of a small bulb into which two electrodes are sealed.

This photo-electric cell has already been applied commercially in the mechanical sorting of cigars according to color.

Conductor Cable

The manufacture of 66,000-volt single-conductor cable was for the first time placed on a commercial basis.

The cable produced can transmit upwards of 33,000 kw. at 66,000 volts. It is slightly over three inches in diameter and requires 250,000 volts to puncture.

High Voltage D-C. Cable Testing Sets

The purpose of direct-current testing sets is to permit power companies to make satisfactory periodic test of underground cables, to determine the condition of insulation between conductor and ground and to locate cable faults, and measurements of insulation resistance. Three types of equipment were developed and standardized for this service.

Radio

The improvements in vacuum tubes for radio purposes were mostly in the direction of increased efficiency of operation and a general betterment of electrical characteristics.

It is also interesting to note that during the year there was started in regular production a new tube of the highest power so far standardized, and also the smallest tube requiring the least power expenditure in the filament that has so far been made available.

Carrier Current

The carrier current system of telephony, which effects communication by means of high frequency currents superimposed on the power conductors of transmission lines, was applied over greater distances than heretofore by the production of a 250-watt transmitter and receiving equipment. The rating of the previous outfit was 50 watts and its maximum range in actual installation was 88 miles.

Lighting

The volume of sales of incandescent lamps serves as a reasonably accurate measure of the expansion of the lighting business. It is estimated that about 225,000,000 large tungsten filament lamps were sold in the United States during the year 1923. This is nearly 11 per cent increase over 1922, and exceeds any previous year. The figures do not include the sale of miniature lamps.

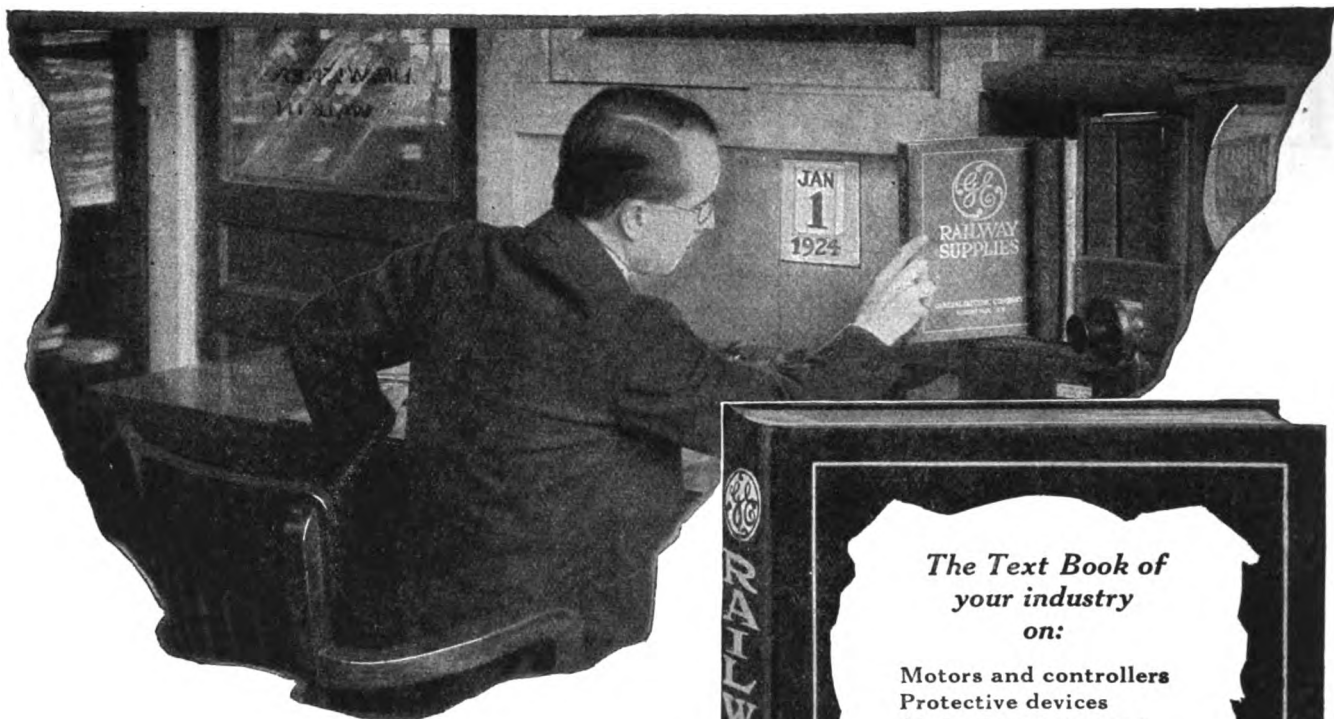
Street Lighting

Traffic continues to multiply so rapidly that the present systems of lighting on thoroughfares in most cases are inadequate and, in an effort to correct this condition and relieve night congestion of traffic, many cities have realized the necessity of revamping their entire street lighting systems. There is a noticeable trend toward high-intensity lighting in the business districts.

Extracted from illustrated article by John Liston, *General Electric Review*, January. Complete article on request. Ask for Publication X767. General Electric Company, Schenectady, N. Y.

95-814

ELECTRIC



"No more substitutes"

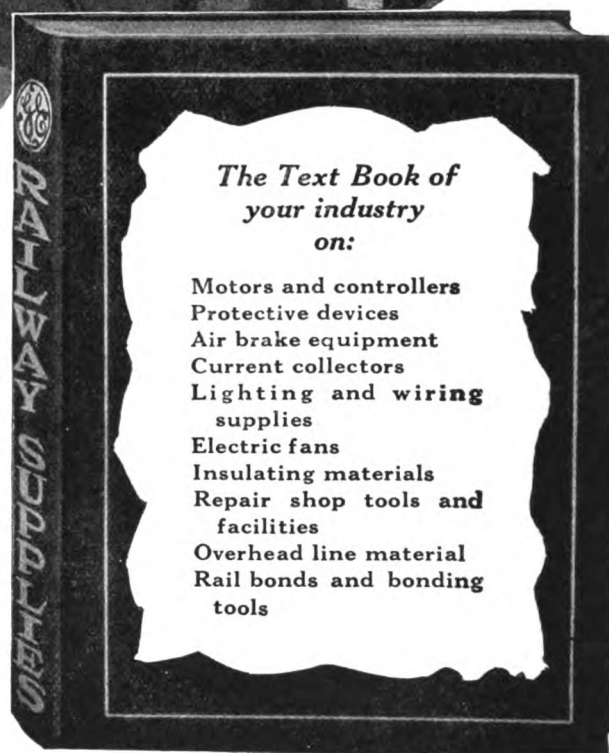
Another good-resolution time is here. If you have not already resolved to stick to known value, to insist on materials of original equipment quality, do it now.

Every manager, superintendent, master mechanic or purchasing agent of every electric railway in this country has his G-E Railway Supply Catalog. It is no longer necessary to purchase supplies at random.

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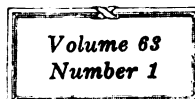
New York, Saturday, January 5, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*



A Great Year for the Electric Railways

ELECTRIC railways purchased 4,029 new cars and locomotives in 1923—more than in any year since 1913, and 14 per cent more than in 1922. In addition they rebuilt 1,256 cars and purchased 621 new motor buses. They built and rebuilt 1,114 miles of track—more than in any year since 1915. Of this, 260 miles was extension of lines, which is the most in any year since 1919.

Though many felt that the advent of the bus spelled the doom of the railway, the railways are not only extending their rail lines but they are rapidly taking up the bus as an auxiliary and feeder, thus making complete the transportation service in their communities.

There occurred during the year twelve receiverships—two less than in 1922, the fewest in any year since 1910, and involving the lowest totals of track mileage and of capitalization in any year in the records of this paper, which date back through 1909. Furthermore, the total number of companies lifted out of receivership or otherwise removed from

bankruptcy was thirty-one—the largest in any year in the record, and involving the imposing totals of 1,794 miles of track and \$305,000,000 in par value of securities.

Finally, the electric railways of the United States expended \$282,000,000 during 1923, aside from the enormous amounts for labor, in the purchase of new plant and equipment and maintenance materials. For the same items they plan to expend \$262,000,000 in 1924. Of these amounts, \$180,000,000 in 1923 and \$150,000,000 in 1924 may be said to be for improvements and expansions, while the remainders are for current maintenance materials.

Thus it is seen that despite the lingering difficulty of disposing of new electric railway securities through the bankers—a condition which lags behind the improved situation and reflects the past rather than the present and future—the industry is forging ahead with its rehabilitation program, both physically and financially.

Trends in Rolling Stock as Shown by Purchases

A STUDY of the rolling stock statistics published in this issue shows that the return to buying which began last year has continued throughout 1923 with increased impetus. The number of new cars ordered this year has exceeded the 4,000 mark which in pre-war days was looked upon as close to the average for yearly car purchases. In 1914 the number of new cars bought dropped to 3,000 and the bottom was reached in 1921 with but 1,276 new cars for the year. The number purchased in 1922 was 3,538 and for 1923 it was 4,029, which is higher than any year since 1913. The nearest approach to this record was in 1916 with 3,942 new cars and electric locomotives.

Another evidence of returning prosperity comes from the fact that there has also been a considerable increase in the number of companies buying new cars. There were 167 for 1923 as compared with 145 for 1922 and but 94 in 1921. There is no doubt that electric railways are becoming more and more able to purchase much-needed rolling stock and to discard obsolete equipment.

The outstanding feature shown by the statistics as to trend of car design is the exceedingly large number of one-man, two-man cars ordered. The popularity prophesied for this type of car in this paper last year has been more than fulfilled. The 1,114 cars of this type ordered during 1923 is about one-half of the total passenger motor cars ordered for city service and nearly as many as the total number of all types of cars purchased in 1921. This type of car is meeting the demand for a unit that can be operated by one man during off-peak periods and still give the advantages of two-man operation during heavy load hours. It also provides a better unit for one-man operation than the single-truck type with which one-man operation was first introduced. The purchases of one-man, single-truck cars with 28-ft. body which were so popular in 1920 fell off materially during 1923, the number being 312 as compared with 772 in 1922.

The number of one-man double-truck cars ordered in 1923 remains about the same as for the year preceding. There were 184 for 1923 as compared with 196 for 1922. In size, the one-man double-truck cars ordered are of about the same length and seating capacity as the one-man, two-man cars. An average length for the two types is about 45 ft. and the average seating capacity is about forty-four. It is interesting to compare this size of car with the double-truck design prepared by last year's committee of the American Electric Railway Engineering Association on unification of car design, which has an over-all length of 42 ft. 1 in. with body 28 ft. 7 in. over all and platforms 6 ft. 9 in. long. The windows are spaced 2 ft. 5½ in. and there are eleven on each side. By adding one more window the length would be 44 ft. 6½ in. and seats for forty-eight passengers would be provided inside the car body. This is about the same as the average for the double-truck, one-man cars, or the one-man, two-man cars ordered last year.

The largest increase of passenger cars ordered last year as compared with preceding years was for interurban service. There were 427 of these as compared with 187 for 1922. There was also a large increase in the number of freight and express cars ordered for

interurban service. These figures show that the interurban roads were active in buying new rolling stock and this augurs well for their continued prosperity.

While much new rolling stock has been added railways have also been busy in remodeling old cars. A total of 1,256 cars were reported as being rebuilt. Of these 581 were remodeled for one-man and seventy-seven for one-man, two-man operation.

The Present Position of the Bus in the Railway Field

TWELVE hundred and seven buses are now being operated by 121 electric railway companies in a variety of services. This number has increased from forty-four companies and 300 buses since October, 1922. Thirty additional railways have definitely indicated to the JOURNAL that they expect to start operation of buses during 1924. And purchases of new buses during next year to the extent of at least 50 per cent of the present total are indicated, but it is probably safe so say that the number will double. Electric railways purchased 621 motor buses during 1923, according to the JOURNAL'S survey which is published in this issue on page 40.

Some of the leading men of the electric railway industry and the principal bus manufacturers believe that in time the electric railways will dominate the bus situation in its major operations and that the electric railways are to be the great market for buses. At the last national convention of the electric railways 24 per cent of all the exhibit space was occupied by buses and bus equipment.

The American Electric Railway Association has formally taken the position that all of the transportation requirements of any community should be furnished by one agency; that that agency should be the electric railway company; that it is the duty of the railways to study and consider the availability of every feasible unit or method for furnishing transportation service; that there is a field in which the bus can furnish service satisfactory alike in operation and economy; that the electric railways should be alive to the possibilities of bus operation, both to handle all the transportation needs of a community and to prevent wasteful competition; that traction officials should not allow an antagonism aroused by jitney competition to blind them to the fact that they must keep pace with developments in the transportation field if they expect to continue to be the recognized agency of transportation in a community; that the motor bus is needed to feed and supplement the rail lines, to open up new territory, and to round out and make complete the passenger transportation on the highways.

It was commonly agreed among railway men that the last convention of the American Electric Railway Association marked the turning point in the predominant sentiment of the railway men from one of antagonism toward the bus to one of appreciation that it is a new transportation tool which they may well endeavor generally to bring into use in its proper sphere. The desire to quash the bus by fair means or foul has now largely been replaced by a more constructive attitude of studying how best to capitalize on the new vehicle. To this end, committees of the American Electric Railway Association and the affiliated Transportation &

Traffic, Engineering, and Accountants' Associations are all working on various phases of the subject.

The president of the American Association recently said in public print that "as soon as the electric railway industry gets to the point—and I think it has reached that point now—where it will utilize the bus to the extent that seems advisable and necessary, then the ELECTRIC RAILWAY JOURNAL would be helping along the idea that it is an accepted practice of electric railways to utilize the bus" by publishing bus articles in the JOURNAL. Continuing, he said "and it will be in the best interests of the industry when that idea is generally accepted. It was too bad it was not accepted, in my opinion, two or three years ago. I think it would have saved a lot of grief and trouble that we may be a long time in remedying."

In view of all this, does it not appear obvious that the industry paper—ELECTRIC RAILWAY JOURNAL—should treat comprehensively the activities of the railways in taking up the bus?

Railway Operation of Buses to Be Treated in the "Journal"

BEGINNING with this issue, the ELECTRIC RAILWAY JOURNAL will publish more fully than heretofore articles dealing with the operation of buses by electric railway companies. By so doing, it is believed the present needs of the electric railways will be better served. The JOURNAL will be better able to record the extent and kind of bus service undertaken by the railways and to aid the railways by pointing out where and under what conditions the bus should be utilized.

Since *Bus Transportation*, offspring and associate of the JOURNAL, was created two years ago, the latter has carried only editorials discussing the broad economics and place of the bus, and brief news items telling of the inauguration of bus operation by railways. Papers on bus operation presented at railway association meetings have been briefly summarized in this paper, frequently with a notation that they would be published more fully in *Bus Transportation*.

Prior to the establishment of *Bus Transportation*, the early progress of the bus was treated to some extent in the JOURNAL, for this paper saw the bus as a useful ally or a troublesome competitor. At that time there was considerable resentment on the part of some railway men at seeing such articles in the paper they had been reading for nearly forty years and happily had come to feel was "their" paper.

While not wishing to incur the disapproval of its life-long readers, the JOURNAL nevertheless was confident that the bus was coming and that a great service could be performed for both the railways and the independent bus operators by advocating its development along lines in keeping with the established principles of sound economics and regulation. So it was decided to treat bus matters in a separate but associated publication—*Bus Transportation*.

At the time of the establishment of this paper in January, 1922, fears were expressed by a few that the same publishers could not successfully produce a paper devoted to the electric railway interests and another to the bus interests. These fears, based on the idea that there was an ineradicable antipathy between bus and electric railway, have been found entirely groundless.

Bus Transportation has now been published monthly for two years, and it is generally accredited with having done a very constructive piece of work.

Preaching, like the ELECTRIC RAILWAY JOURNAL, the idea of co-ordination of all local means of transportation, and otherwise following along the same lines of editorial policy, it has undoubtedly been a steady force in the direction of sound bus development. It is probably not too much to say that the policy adopted upon the establishment of *Bus Transportation* and strongly advocated by both that paper and ELECTRIC RAILWAY JOURNAL has had a great deal to do with the present reconciliation of what might have been antagonistic forces.

The rapid development of the bus and its acceptance as a transportation agent by many electric railway companies during the past two years call now for a more extensive treatment of the bus in the JOURNAL. So many electric railway companies now run bus services and so many others are contemplating doing so that it is evident that there has been a profound change in the attitude of the railway men toward the bus. The previous editorial gives a more definite summary of this evidence. Railway men are coming to take the position that they are "transportation men" and that if there is anything to the bus they are the ones who should make use of it. They want now to keep advised on what the industry is doing with the bus, and they expect the industry paper—the JOURNAL—to supply this information. Conforming with this need, the JOURNAL will undertake to do so from now on.

Bus Transportation will continue to be the all-bus paper, covering all important news and developments of the bus everywhere by whomever operated. ELECTRIC RAILWAY JOURNAL will treat only of such bus operation as is carried on by electric railway and affiliated companies. It will promote the utilization of the bus as an auxiliary of the railway in a co-ordinated transportation plan, for it believes thoroughly that the public can best be served—in fact, can be served satisfactorily only when all the transportation facilities of a community or territory are under a single management.

The JOURNAL will treat primarily the economics of the bus, the kinds of service in which railways put it to use, the conditions of such use, how it is co-ordinated with the railway service, questions of policy and such broad matters as regulation, taxation, etc., depending upon *Bus Transportation* for the technical material, such as detail bus design, bus maintenance, and the technique of bus operation in general.

From this it will be seen that the railway man who is operating buses and wishes to keep informed on all phases of bus operation and all developments of the bus will want to read *Bus Transportation* as well as the JOURNAL.

To start off on this program, the JOURNAL has undertaken to bring together a comprehensive summary of the present operation of buses by electric railways. A survey of the entire industry has been made to determine the number of railways that have taken up the bus and the kind of service in which they have placed it, as well as to learn the general feeling up to the present time about the advantages, limitations, and possibilities of the bus, as railway men view it. This summary, including a tabulation of the data, is published in this issue, beginning on page 5.

\$262,000,000 for New Plant and Equipment and Maintenance Materials

CITY and interurban electric railways of the United States will spend the sum of \$262,000,000 for new plant and equipment and for maintenance materials during 1924. Of this, the estimated expenditure for new plant and equipment, such as new cars, buildings, power apparatus, shop tools and track machines, new paving, new materials for track construction or reconstruction, various car devices, etc., amounts to \$150,000,000. This compares with \$180,000,000 for the similar expenditures actually made during 1923.

For materials and supplies for routine maintenance work, it is estimated that the electric railways in the United States will spend \$112,000,000 in 1924, as compared with actual expenditures of \$102,000,000 in 1923.

The total proposed expenditure of \$262,000,000 in 1924 compares with \$282,000,000 spent in 1923. These expenditures will be divided among the three main accounts of the standard A.E.R.A. classifications, as shown in the accompanying table.

From the estimates summarized herewith, it appears that the electric railways will expend some \$30,000,000 less for new plant and equipment in 1924 than they did in 1923. What this probably reflects is that the tremendous need for reconstruction and rehabilitation and new equipment in all departments which existed for the first few years subsequent to the war has in part been met, and that the program of expenditures is dropping back slightly to what is more nearly a normal program of replacement and improvement. This is probably particularly true of way and structures expenditures, which in this estimate shows the largest drop. The expenditures for new cars holds up fairly well on account of the extensive trend toward new cars of the one-man and one-man, two-man type. Similarly, the expenditures for power accounts is holding up large, probably on account of the extensive adoption of automatic substation equipment.

HOW THE FIGURES WERE OBTAINED

The JOURNAL undertook last year for the first time to get an estimate of the budget of the industry covering expenditures to be made for new plant and equipment. Information was requested from the 197 Class A companies as to 1922 and 1923 expenditures. Forty-seven companies supplied figures as to their actual 1922 expenditures and their proposed 1923 expenditures. The figures for the entire industry were then calculated from the summaries of these forty-seven companies, the estimates being based proportionately on track mileage and cars operated. Both track and cars were used because neither alone gives a proper measure of the buying power of the industry.

This year, similar information was requested from the same list of companies and fifty supplied their actual expenditures for 1923 and proposed expenditures for 1924. From these the corresponding figures for the entire industry were calculated as before. This new figure for 1923 provides a check on the budget estimate published in the JOURNAL last year.

Based on what the roads estimated they would expend

during 1923 for new plant and equipment, an industry budget of \$240,000,000 was estimated. Based on what the roads report as having actually expended during 1923 in the present canvass, the figure is \$180,000,000. While this discrepancy is large, it can probably be accounted for in major part by two things.

In the first place, the JOURNAL asked for separate

Electric Railway Journal's Estimate of Industry Expenditures During 1923 and 1924

For New Plant and Equipment		
	1923	1924
Way and structures	\$74,000,000	\$53,000,000
Equipment	78,000,000	70,000,000
Power	28,000,000	27,000,000
Total	\$180,000,000	\$150,000,000
For Maintenance Materials and Supplies		
	1923	1924
Way and structures	\$42,000,000	\$44,000,000
Equipment	44,000,000	53,000,000
Power	16,000,000	15,000,000
Total	\$102,000,000	\$112,000,000
Total for New Plant and Equipment and Maintenance Materials		
	1923	1924
Way and structures	\$116,000,000	\$97,000,000
Equipment	122,000,000	123,000,000
Power	44,000,000	42,000,000
Total	\$282,000,000	\$262,000,000

figures on expenditures for maintenance materials and supplies this year, but did not ask for these at all last year. It is quite possible that some of the companies included maintenance materials in their figures for 1923, and segregated them this year. There is opportunity for some confusion here. It is impossible definitely to define the two classifications. It is not a division between expenditures for capital account and expenditures for operating account that the JOURNAL was seeking, but rather what the railways are going to spend during the year, so far as it means purchasing of new materials and equipment from the manufacturers, regardless of the account to which it is charged.

The second item in accounting for the difference is that it is known that a number of companies planned to do considerably more work in 1923 than they were able to get completed, so that the actual expenditures reported reflect this. Furthermore, the budget of a company often provides for the purchase of new equipment which may not be delivered on account of delays until the following year and therefore the expenditure is not made, as planned in the budget.

The figures reported by the companies last year, covering actual expenditures for 1922 for new plant and equipment, and expanded for the industry estimate were: Way and structures, \$85,000,000; equipment, \$38,000,000; power, \$28,000,000; total, \$151,000,000.

It is perhaps worth noting that the figures included herewith covering the expenditures for maintenance materials and supplies represent the first definite attempt, it is believed, to find out what the electric railways spend annually for routine maintenance materials.

Extent and Kind of Bus Operation by Electric Railways

A Summary of the Methods of 121 Companies Based on a Nation-Wide Survey of the Industry Shows that Feeder Service Is the Most Common Form of Operation—Great Expansion Is Planned for 1924—The Railway, However, Remains the Cornerstone of the Transportation System in the General Opinion, Though Finding the Bus Useful as an Auxiliary

AS THE result of a nation-wide survey just completed by the **ELECTRIC RAILWAY JOURNAL**, it has been found that the electric railways in the United States and Canada are now operating more than 1,200 motor buses. This is nearly three times the number which were reported to be in operation during the year 1922, and is an increase of 80 per cent over the number reported at the time of the American Electric Railway Association convention in October, 1923. A year ago there were fewer than fifty railways engaged in bus operation, while now there are 121. Much of this expansion has come during the past few months, a number of railways having inaugurated bus service since Nov. 1. Besides the companies which are already engaged in bus operation, thirty other electric railways have signified their intention of commencing such operation during the coming year. Many of the companies now operating buses are planning during 1924 to add materially to the number in use.

Bus operation is handled in a number of cases by subsidiary companies controlled by the railways. On the other hand an equal number of railways operate buses directly in their own names, so that there seems to be no general rule in this matter. In addition to the buses mentioned in the foregoing paragraph there are known to be several hundred operated under the indirect control of railway companies but which for various reasons are not included in their reports.

Many classes of service are comprised in the bus operations of the electric railways. By far the most common service, however, is that of feeder to the railway lines. A number of companies have inaugurated bus service instead of extending their tracks into new territory. Bus service has replaced railway service in some cases when an extensive program of track and paving rehabilitation would have had to be undertaken in order to continue railway operation. In some cases buses have been used for operation on crosstown feeder routes connecting with several railway lines. The complete substitution of bus service for railway service in small towns has been tried by two or three companies. Interurban and boulevard service are also included among the various uses to which the electric railways are putting the bus, but instances of such operation are not numerous.

When buses are operated as feeders to the existing street railway systems the same fare is usually charged as is charged on the cars. In many such cases free transfers are issued interchangeably. Where buses are operated on boulevard service the fare is almost invariably higher than the local railway rate and ordinarily there are no transfers issued. This same situation as to fares and transfers prevails also in some places

where the bus is used to furnish transportation to sparsely settled districts where traffic demands are not great enough to justify extensions to the railway lines.

Officials of electric railways operating buses seem in general to be well pleased with the results accomplished by such operation. While buses are in many cases not directly profitable to the company, they nevertheless furnish a necessary service at less cost than could be done in any other way. The nature of the territory through which these routes are operated is usually such that no immediate profit can be expected from any transportation service. The railways have, however, not only acquired much public good will by the inauguration of bus service in the sparsely settled districts but to a great extent have also protected their own interests by forestalling possible competition.

AUXILIARY OR FEEDER SERVICE CAN BEST BE PROVIDED BY THE BUS

A few railway companies have done very well and are making a direct profit from the operation of motor buses. This is in most cases the result of comparatively high fares for short hauls. The consensus of opinion expressed by those having experience is that the bus cannot replace the electric railway for ordinary city service. Nearly all railway operators find it an unsatisfactory vehicle for mass transportation, but say that in auxiliary or feeder service it has a distinct and important place.

A point brought out by the remarks of some railway officials concerning the bus is to the effect that the bus should more properly be referred to as a "coach." It is thought that the word "bus" inadequately describes the attractive and commodious vehicles now widely used. This practice is being followed by the Pennsylvania-Ohio Electric Company, which operates its buses under the name of the Pennsylvania-Ohio Coach Lines, and always refers to them as coaches. Some other companies do likewise.

Indications are that bus operations by electric railways will increase greatly during the coming year. As already mentioned, thirty companies have definitely stated that they are contemplating the inauguration of bus service. The companies which are now operating buses are planning the purchase of much new equipment in 1924. In general an addition of about 50 per cent of the present number of buses will be made to the equipment of the railways operating them. One large company which spent \$200,000 on buses in 1923 intends to expend an additional \$100,000 during the coming year. Two other companies operating more than thirty buses now plan to increase the number 100 per cent next year.

The figures in the accompanying table were compiled from the answers received by the ELECTRIC RAILWAY JOURNAL to a questionnaire sent to all the electric railways throughout the country, and from other data in the JOURNAL files. The experiences of various companies are given in the following paragraphs:

NEW ENGLAND STATES

The Connecticut Company, New Haven, operates forty-seven buses on various lines in city districts otherwise unserved, in rural districts where no other means of transportation is available, and also in rural districts where short routing gives facilities superior to the rail line. In the city the rates are the same as on the railway, but in the outlying territories bus fares are higher. In the opinion of the company the bus fills a very necessary place as an adjunct to existing rail lines, and also meets a public desire for a better service over some routes at a higher rate.

The Eastern Massachusetts Street Railway, Boston, operates thirty-one buses on various routes throughout its territory. The company says: "In substantially every instance our buses are running on lines formerly served by our electric cars. In most cases the buses were put into service some time after the cars had been stopped on account of poor condition of track and poor earnings. On only two routes were the buses put in at the same time that the cars were stopped. Most of our operation is in small towns or between small towns, and in all cases in very light riding territory.

"The rate of fare on our buses is approximately the same as on street cars in similar territory on our property. We do not generally use transfers on this system, but in some special cases they are issued between cars and buses. The rates on the buses vary in different places over a wide range, but 2½ cents a mile is about typical of the rate on the suburban lines. We have no real interurban runs.

"Our buses have operated quite satisfactorily and in some divisions have demonstrated that they can be operated at a reasonable cost. Our principal difficulty is poor earnings on the lines where they are operated. The operation of buses has been a satisfactory way out of the problems presented by the necessity otherwise of completely rebuilding a line where riding is light. Buses have been very easily able to take care of the volume of business offered on the lines where we are operating them. We have had no bus experience with particularly heavy traffic."

The Boston Elevated Railway has had buses in service since the early part of 1922, and the plans of development call for buses as a regular part of its service. In all cases these buses are used in the suburban districts, in several instances to supply service on routes formerly operated by trolley. The change in these cases was usually made for economic reasons, it being thought that the bus service would result in less loss than that by trolley car. There is no competitive jitney service in the Boston Elevated territory.

So far as fares are concerned, the buses form an integral part of the system and give and accept transfers from trolley cars under conditions where transfers would have been given and honored if the route was operated by trolley cars. Bus operators on the Boston Elevated system are classed with the operators of the trolley cars and receive the same wages, including the regular bonus for one-man operation, as all buses are one-man operated.

The Springfield Street Railway, Springfield, Mass., operates four buses in feeder service. Bus receipts are less than the actual operating costs plus depreciation, interest on investment, etc. The operation is primarily for the purpose of protecting the railway investment.

The United Electric Railways, Providence, R. I., operates twenty-eight buses in intercity express service and also in routine local passenger service. On the basis of earnings bus operation is paying well on certain routes throughout all months of the year. Certain other routes, on account of local conditions, have such variable traffic that operating deficits occur periodically. Unquestionably, the bus operation supplies a service demanded at a lesser loss than would be incurred through railway operation. Moreover, the company feels that bus operation protects the railway investment and discourages independent jitney operation over new routes.

The greatest advantage apparent in bus operation is the relatively low capital investment required to render a service adequate to meet small traffic demands. In the opinion of the company the greatest limitation of the bus lies in its inability to compare with the electric railway car for extremely heavy passenger demands.

The Twin State Gas & Electric Company, Brattleboro, Vt., has discontinued railway service altogether and now provides the public with transportation entirely by means of buses. These buses operate on a thirty-minute headway, an improvement over the previous street car schedule.

EASTERN STATES

The Capital Traction Company, Washington, D. C., owns and operates eight buses. Three bus lines are operated as extensions to the existing street railway system. One line replaces the trolley service formerly furnished by another small company, and one bus is operated in place of an owl car. The rates of fare on street railways and buses in the District of Columbia are the same and transfers are issued at the rate of 2 cents each except where buses have replaced existing trolley service. In these instances all transfers are free.

Bus operation by this company has so far been expensive. Since operations began the average revenue per bus mile has been 8.22 cents, while the average expense was 20.73 cents. The latter figure represents only what is entered on the books as bus expense and does not include overhead. The company believes, however, that the buses are well worth their cost as they furnish service which the public demands and which would cost much more to furnish by means of extensions to the electric car lines.

The Capital Traction Company has had no experience in the handling of heavy traffic by buses but is firmly of the opinion that the bus cannot compete with the electric railway for mass transportation.

The United Railways & Electric Company, Baltimore, one of the pioneers in bus operation, now runs thirty-six buses under the name of the Baltimore Transit Company. These buses are operated in city service, as an alternative to the street cars in two instances, and on two more routes as feeder service. On the feeder routes the fare is the same as on the railway, but on the alternative city routes the bus fare is 10 cents. In the first case transfers are exchanged and in the second they are not.

The company expresses its opinion of bus operation

as follows: "We believe that buses have a field for operation as a supplement to the street railway system, either as an alternative service, as feeder service, or as pioneer service, so called. We feel that the operation of buses in Baltimore has been justified and that moreover they have helped us to maintain our position as the corporation supplying transportation to all sections of the community.

"Our experience as to the advantages and limitations of the bus is in general similar to that of other companies. It is not a vehicle adapted to handling mass transportation, but has advantages for furnishing superior service on the basis of a seat for each passenger, thus in effect being a kind of limited service as this word is understood in connection with railroad service."

The Public Service Railway, Newark, operates two bus lines in the city of Camden and one feeder line in sparsely settled territory. On one of the former, a crosstown route, the bus has supplanted the railway service altogether. This is a short line crossing several street car lines and connecting with the ferry. The same fare is charged as on the railway, 5 cents, and no transfers are issued. On another route the buses have partly supplemented the railway service and serve also to some extent as an extension to the line. The feeder bus route connects a small town about a mile from the railway with an interurban car line. Results of these operations are considered to have been entirely satisfactory.

The New York State Railways operates buses in Rochester and in Utica. In the former city they are operated in a section not otherwise served and connect with one of the railway lines. The fare is divided into three zones, the rate within the city zone being 7 cents with transfer, 3 cents between the city line and the end of the first zone and 15 cents to the end of the route with transfer privilege. A reduced rate ticket is also in effect. In Utica the fare on the buses is 7 cents. According to the company, the operation of buses seems to be working out very satisfactorily.

The Altoona & Logan Valley Electric Railway, Altoona, Pa., operates seven buses under the name of the Logan Valley Bus Company. There is a fare differential in favor of the railway of 3 cents, the bus fare being 10 cents and the railway fare 7 cents. Free transfers are issued from the bus to the railway, but a charge of the additional 3 cents is made for a transfer from the railway to the bus. This service has been in operation only a few months, and although business is gradually picking up it is still more in the nature of an accommodation to the territory served than a source of profit to the railway. However, the company believes that the bus is a good feeder to the trolley from points where service is required but where traffic is not sufficiently heavy to warrant the building of a railway line.

The Conestoga Traction Company, Lancaster, Pa., operates buses under the name of the Conestoga Transportation Company, at the same fare as the railway. No transfers are issued, however, and a separate fare is collected by each company. The railway says: "Bus operation seems satisfactory to the public and avoids the expenditure of a larger sum of money by the street car company to construct a car line through undeveloped territory. The bus operation thus far has been conducted at a slight loss, which we feel is about offset by the increase in passengers riding on the electric railway lines."

The Citizens Traction Company, Oil City, Pa., operates two bus lines, one being a city line and the other an interurban line. On the city line the railway fare is 8 cents and the bus fare 10 cents, and transfers are issued. In interurban service the railway fare is approximately 2½ cents a mile, whereas the bus fare is 4 cents a mile. The company thinks that bus operation is not satisfactory on an earnings basis. It does, however, provide service demanded at a lower cost than the railway could do in an outlying district. Bus service is also important in protecting the railway investment. The experience of this company leads to the belief that the bus is not suited for mass transportation and is advantageous only where the traffic is light.

The Philadelphia Rapid Transit Company operates fifteen buses under the name of the Philadelphia Rural Transit Company. It is expected that five additional buses will soon be placed in service. This operation is auxiliary to the street railway service, although a 10-cent fare is charged instead of 7 cents. The length of time this route has been operated is so short that no definite conclusions have yet been reached by the company concerning the merits of bus operation.

The West Chester Street Railway has, through its subsidiary, the Peoples Transportation Corporation, acquired control of all the motor bus routes in southern Chester County, connecting points in this district with the cities of Chester, Pa., and Wilmington, Del., and a co-ordinated plan of railway and motor bus transportation for the whole district is now being worked out.

Another railway which formerly operated from West Grove to Kennett Square, a distance of 7½ miles, and thence 14 miles southward to the outskirts of Wilmington, ceased operation in April, 1923. Most of the traffic had been on the Kennett-West Grove division, the earnings of which practically carried the whole property. This portion of the line has now been taken over by the West Chester Street Railway. The remainder of the old road has been sold and the tracks taken up, the district being served by buses of the West Chester Company.

The York Railways, York, Pa., operates three buses under the name of the York Transit Company. One bus line is a feeder to an 8-mile interurban line. The other operates in territory not served by the railway. The line operating as a feeder has been decidedly unprofitable, even though additional travel on the railway is considered. Unless traffic increases so that the bus line will be self-supporting, in the near future application will be made for its discontinuance. The second line has not been in operation sufficiently long for the company to be able to pass judgment upon its success. This railway says:

"We cannot find any physical advantages of the bus over the electric car, but bus lines when tried and found unprofitable do not, of course, entail the enormous loss which would occur in the construction and operation of cars on tracks. The bus has its advantages under certain conditions, and in many instances can no doubt be used profitably as a feeder to the existing railway lines."

The Monongahela Railway & Power Company, Fairmont, W. Va., recently purchased the Marietta Bus Company, which will be continued under the name of the Pioneer Transport Company. It is planned to furnish service in connection with the street railway operation in the city of Marietta. Under the present

Summary of Bus Operation by Electric Railway Companies

Name of Railway	Name of Bus Subsidiary	Number of Buses	Date Operation Began	Kind of Service	Rate of Fare		Transfer to Railway
					Bus	Railway	
CONNECTICUT							
Danbury & Bethel St. Ry., Danbury.....		5	Aug. 1921	2&3	10	10	Free
Connecticut Co., New Haven.....		47	July 1921	2-3-4-5	10	10	Free
Groton & Stonington St. Ry., Norwich.....		5	Nov. 1922	2-3-5	05	05	None
Hartford & Springfield St. Ry., Warehouse Point.....		2	Dec. 1923	2	10	10	....
MASSACHUSETTS							
Eastern Mass. St. Ry., Boston.....		31	Jan. 1922	2-3-4-5	10	10	Free
Boston Elevated Ry.....		31	Feb. 1922	2-3-4	05	10	None
Connecticut Valley St. Ry., Greenfield.....		1	Nov. 1922	5	10	10	None
Northern Mass. St. Ry., Greenfield.....		1	Aug. 1922	2	05	10	None
Holyoke St. Ry.....		3	July 1921	3	06	06	None
Union St. Ry., New Bedford.....		3	Dec. 1923	4	05	05	....
Plymouth & Brockton St. Ry., Plymouth.....		2	Feb. 1923	2	07	07	Free
Springfield St. Ry.....		4	Feb. 1923	2	07	07	Free
RHODE ISLAND							
United Elec. Rys., Providence.....		28	July 1922	3-4-5	06	06	Free
VERMONT							
Twin State Gas & Elec. Co., Brattleboro.....		3	Aug. 1923	6	10	Discontinued	....
DISTRICT OF COLUMBIA							
Capital Traction Co., Washington.....		8	Feb. 1923	2	08	08	02
Washington Ry. & Elec. Co.....		17	May 1922	2-3-4	08	08	Free
Washington-Virginia Ry.....		4	Jan. 1922	2	05	05	Free
MARYLAND							
United Rys. & Elec. Co., Baltimore.....	Baltimore Transit Co.....	36	 1915	2&3	10	07	Free
Potomac Edison Co., Cumberland.....		2	Jan. 1924	3	10	07	....
Potomac Public Service Co., Frederick.....		15	 1923	5	10	08	....
NEW JERSEY							
Millville Traction Co.....		1		2			
Morris County Traction Co., Morristown.....	Dover Bus Co.....	1	July 1923	2	05	07	02
Public Service Ry., Newark.....	Public Service Transp. Co.....	27	July 1922	2&4	05	05	None
Tranton & Mercer County Traction Corp.....	Central Transp. Co.....	5	Sept. 1923	3	08	08	01
NEW YORK							
International Ry., Buffalo.....	International Bus Corp.....	3	Sept. 1923	2	07	07	Free
Jamestown St. Ry.....		11	Mar. 1922	3	08	08	Free
Orange County Traction Co., Newburgh.....	Newburgh Pub. Service Corp.....	32	Mar. 1922	6	07	Discontinued	....
Niagara Gorge R. R., Niagara Falls.....	Niagara Gray Bus Line.....	10	1921				
N. Y. State Rys. (Rochester Lines).....		3	Nov. 1923	2	07	07	Free
N. Y. State Rys. (Utica Lines).....	Utica Ry. Co-ordinated Bus Line.....	4	Oct. 1923	2	07	07	Free
PENNSYLVANIA							
Altoona & Logan Valley Elec. Ry.....	Logan Valley Bus Co.....	7	July 1923	2	10	07	Free
Schuylkill Ry., Girardville.....	Schuylkill Transp. Co.....	6	July 1922	3	10		
Johnstown Traction Co.....	Traction Bus Co.....	3	Dec. 1922	2			
Conestoga Traction Co., Lancaster.....	Conestoga Transp. Co.....	2	April 1923	2	06	06	None
Lewistown & Reedsville Elec. Ry.....	Lewistown Transp. Co.....	2	Jan. 1924	2	06	06	Free
Beaver Valley Traction Co., New Brighton.....		2	June 1923	2	10	05	Free
Citizens Traction Co., Oil City.....	Citizens Transit Co.....	4	July 1921	2&5	{ 4c. mi.	{ 2.5c. mi.	Free
Philadelphia Rapid Transit Co.....	Philadelphia Rural Transit Co.....	20	Sept. 1923	2	10	07	03
Pittsburgh, Harmony, Butler & New Castle Ry., Harmony.....		3	April 1923	5			
Jefferson Traction Co., Punxsutawney.....		3					
West Chester St. Ry.....	Peoples Transportation Co.....	14	1923	5			
York Rys.....	York Transit Co.....	3	Aug. 1923	2&5	10	07	Free
WEST VIRGINIA							
Wheeling Public Service Co.....		4					
Monongahela Power & Ry., Fairmont.....	Pioneer Transport Co.....	8	Jan. 1924	2&5	07	07	None
Princeton Power Co.....		1	 1923	2			
ILLINOIS							
Centralia Traction Co.....		1		2	10	10	Free
Chicago & West Towns Ry., Oak Park.....		2	Jan. 1923	2	10	08	Free
East St. Louis Ry.....		4	Mar. 1923	4	08	08	Free
Chicago, North Shore & Milwaukee R. R., Highwood.....		27	Aug. 1922	2&5	Ticket 3.6c 4c. mi.	3c. mi. 3.3c. mi.	Free
Chicago & Joliet Elec. Ry., Joliet.....	Chicago & Joliet Transp. Co.....	2	April 1923	5	15		None
Rockford City Traction Co.....		6	April 1922	2	10	10	Free
Tri-City Ry., Rock Island.....		2	Nov. 1923	2	10	10	Free
INDIANA							
Gary St. Ry.....		7	May 1922	3	10	10	Free
Gary & Valparaiso Ry., Gary.....		1	Dec. 1922	5			....
Chicago, South Bend & Northern Ind. Ry., South Bend.....		3	Sept. 1923	3	08	05	Free
IOWA							
Des Moines City Ry.....		6	 1923	2			
Dubuque Elec. Co.....		3	June 1914	2	10	08	None
Waterloo, Cedar Falls & Northern Ry., Waterloo.....	Cedar Valley Road.....	6	Jan. 1923	5	15		Free
KENTUCKY							
Louisville Ry.....	Kentucky Carriers, Inc.....	12	June 1923	1&3	10		....
MICHIGAN							
City of Detroit (Dept. St. Rys.).....		5*	Nov. 1923	2	06	06	None
Grand Rapids Ry.....		6	April 1923	2	10	10	Free
Houghton County Traction Co., Houghton.....	Houghton City Bus Co.....	3		5			
Michigan United Rys., Jackson.....		11	Mar. 1922	2&3	08		Free
Muskegon Traction & Lighting Co.....		1	Nov. 1923	4	10	10	Free
Saginaw-Bay City Ry.....	Saginaw Transit Co.....	25	Nov. 1923	3			
MINNESOTA							
Mankato Elec. Traction Co.....		2	Sept. 1923	5	07	05	
Twin City Rapid Transit Co., Minneapolis.....		1	Dec. 1921	2	06	06	Free
MISSOURI							
Springfield Traction Co.....		13	Aug. 1921	3	05	07	02
OHIO							
Northern Ohio Traction & Light Co., Akron.....	Northern Transit Co.....	17	Mar. 1922	2&5	05	05	Free
City of Ashtabula (Div. St. Rys.).....		1					
Steubenville, E. Liverpool & Beaver Valley Trac. Co., E. Liverpool.....	Valley Motor Transp. Co.....	2	Aug. 1923		10		None

*Operated under agreement with Detroit Motorbus Company.

Summary of Bus Operation by Electric Railway Companies—(Continued)

Name of Railway	Name of Bus Subsidiary	Number of Buses	Date Operation Began	Kind of Service	Rate of Fare		Transfer to Railway
					Bus	Railway	
OHIO—(Continued)							
Hocking-Sunday Creek Trac. Co., Nelsonville..		1	 1922	..	05	03	....
Columbus, Newark & Zanesville Elec. Ry.,							
Columbus.....	C. & Z. Transp. Co.....	13	Jan. 1923	2&5	9 @ 50	9 @ 50	Free
Springfield St. Ry.....		1	Nov. 1923	2	07	07	Free
Indiana, Columbus & Eastern Trac. Co.,							
Cincinnati.....	Dayton & Columbus Transp. Co.....	15	Feb. 1923	2&5	3c. mi.	..	....
Community Traction Co., Toledo.....		4	.....	..	3c. mi.	..	....
Penn.-Ohio Elec. Co., Youngstown.....	Akron-Youngstown Bus Co.....	26	Aug. 1922	2&5	10	10	Free
Youngstown Municipal Ry.....	P-O Coach Lines Co.....	31	Sept. 1922	2	08	08	01
Youngstown & Suburban Ry.....	Youngstown & Suburban Transp. Co.	4	April 1923	5	2.4c. mi.	2.8c. mi.	None
WISCONSIN							
Wisconsin Public Service Corp., Green Bay....	Riverview Motorbus Co.....	3	 1922	5	10	07	Free
Wisconsin Gas & Electric Co., Kenosha.....		6	.....	2	07	07	Free
Milwaukee Elec Ry. & Lt.....	Wisconsin Motor Bus Lines.....	100	Aug. 1919	1-2-5	10	07	None
Eastern Wisconsin Elec. Co., Oshkosh.....		8	Aug. 1922	5	3.5c. mi.	08	....
Wisconsin Valley Elec. Co., Wausau.....	Valley Transit Co.....	4	Nov. 1921	6	10	Discontinued	....
Merrill Bus.....							
ALABAMA							
Birmingham Ry., Lt. & Power Co.....		4	Oct. 1923	2	07	07	Free
ARKANSAS							
Arkansas Central Power Co., Little Rock.....		1	Nov. 1923	2	..	..	....
Intercity Terminal Ry., No. Little Rock.....		12	 1922	3	06	..	....
MISSISSIPPI							
Vicksburg Light & Traction Co.....		2	Oct. 1923	2	07	07	Free
SOUTH CAROLINA							
South Carolina Gas & Elec. Co., Spartanburg..		4	Sept. 1923	6	05	Discontinued	....
CALIFORNIA							
Bakersfield & Kern Elec. Ry., Bakersfield....		5	May 1915	2	05	05	Free
Los Angeles Ry.....	Los Angeles Motor Bus Co.....	100	Oct. 1923	1-2-3-4	10	05	Free
Pacific Elec. Ry., Los Angeles.....	Pacific Elec. Land Co.....	102	 1917	2&5	06	06	Free
San Francisco-Oakland Terminal Rys., Oakland		4	May 1921	2	3c. mi.	2.75c. mi.	Free
Pacific Gas & Elec. Co., Sacramento.....		4	 1922	2	06	06	....
San Diego Elec. Ry.....		3	Nov. 1922	2	05	05	Free
Municipal Ry. of San Francisco.....		8	Feb. 1918	2	05	05	Free
Peninsular Ry., San Jose.....		3	Sept. 1922	2	10	06	....
Santa Barbara & Suburban Ry.....		6	Jan. 1917	2	08	08	Free
Stockton Elec. R.R.....		3	 1915	2	..	..	....
KANSAS							
Kansas Elec. Power Co., Lawrence.....		2	Aug. 1923	3	08	08	Free
Salina St. Ry.....		1	 1920	..	10	..	....
NEW MEXICO							
City Electric Co., Albuquerque.....		1	Dec. 1921	3	07	07	Free
OKLAHOMA							
Tulsa St. Ry.....		23	July 1922	3	07	07	Free
Okmulgee Traction Co.....		3	 1920	3	10	..	Free
SOUTH DAKOTA							
Sioux Falls Traction System.....		5	May 1923	2	10	06	Free
TEXAS							
Eastern Texas Traction Co., Beaumont.....		1	Dec. 1923	2	10	..	....
Northern Texas Traction Co., Fort Worth.....	Fort Worth Auto Bus Co.....	8	May 1917	2	07	07	Free
San Antonio Public Service Co.....		10	July 1923	3	06	06	Free
UTAH							
Utah Light & Traction Co., Salt Lake City....		2	Oct. 1923	4	10	..	....
WASHINGTON							
Puget Sound International Ry. & Power Co.,							
Everett.....		17	Dec. 1922	5	..	..	....
Pacific Northwest Traction Co., Seattle.....	Thompson-Smith Transp. Co.....	13	July 1921	5	3c. mi.	..	....
Seattle Municipal Street Ry.....		10	Nov. 1919	2	10	10	Free
Seattle & Rainier Valley Ry., Seattle.....		2	.....	2	05	10	None
Pacific Traction Co., Tacoma.....		2	July 1923	5	..	..	....
Tacoma Ry. & Power Co.....		2	Feb. 1923	2	10	..	Free
CANADA							
British Columbia Elec. Ry., Vancouver.....		2	April 1923	2	6 @ 35	6 @ 35	Free
Toronto Transportation Commission.....		15	Sept. 1921	2	07	07	Free
Winnipeg Elec. Ry.....		11	May 1918	2	07	07	Free
Montreal Tramways.....		2	Nov. 1921	2	07	07	Free
Nova Scotia Tramways & Power Co., Halifax....		2	.....	..	..	..	....
PANAMA							
Panama Elec. Co., Panama.....		2	.....	..	..	..	....
CLASSIFICATION OF SERVICE							
1—Boulevard; 2— Rail line extension; 3— New route to city center; 4—Crosstown Auxiliary; 5—Interurban; 6—Complete substitution							

CLASSIFICATION OF SERVICE

1—Boulevard; 2—Rail line extension; 3—New route to city center; 4—Crosstown Auxiliary; 5—Interurban; 6—Complete substitution

plan these buses will parallel street railway lines for part of the route over which they are operated, but will be so scheduled that they come in between the regular street cars.

In addition to bus operation in Marietta the company has purchased buses to be operated between the city of Morgantown, W. Va., and the terminus of the railway line at Rivesville, which is about 5 miles north of the city of Fairmont. It is planned to sell through transportation from Fairmont to Morgantown, transferring

passengers at Rivesville from the cars to the buses or vice versa.

CENTRAL STATES

The East St. Louis Railway operates four buses in crosstown service where no transportation facilities previously existed. The same rates are charged on the railway and on the buses and free transfers are issued. In every way the buses are on the same basis as the street cars. Bus operation has been as satisfactory as

Trends in Rolling Stock as Shown by Purchases

A STUDY of the rolling stock statistics published in this issue shows that the return to buying which began last year has continued throughout 1923 with increased impetus. The number of new cars ordered this year has exceeded the 4,000 mark which in pre-war days was looked upon as close to the average for yearly car purchases. In 1914 the number of new cars bought dropped to 3,000 and the bottom was reached in 1921 with but 1,276 new cars for the year. The number purchased in 1922 was 3,538 and for 1923 it was 4,029, which is higher than any year since 1913. The nearest approach to this record was in 1916 with 3,942 new cars and electric locomotives.

Another evidence of returning prosperity comes from the fact that there has also been a considerable increase in the number of companies buying new cars. There were 167 for 1923 as compared with 145 for 1922 and but 94 in 1921. There is no doubt that electric railways are becoming more and more able to purchase much-needed rolling stock and to discard obsolete equipment.

The outstanding feature shown by the statistics as to trend of car design is the exceedingly large number of one-man, two-man cars ordered. The popularity prophesied for this type of car in this paper last year has been more than fulfilled. The 1,114 cars of this type ordered during 1923 is about one-half of the total passenger motor cars ordered for city service and nearly as many as the total number of all types of cars purchased in 1921. This type of car is meeting the demand for a unit that can be operated by one man during off-peak periods and still give the advantages of two-man operation during heavy load hours. It also provides a better unit for one-man operation than the single-truck type with which one-man operation was first introduced. The purchases of one-man, single-truck cars with 28-ft. body which were so popular in 1920 fell off materially during 1923, the number being 312 as compared with 772 in 1922.

The number of one-man double-truck cars ordered in 1923 remains about the same as for the year preceding. There were 184 for 1923 as compared with 196 for 1922. In size, the one-man double-truck cars ordered are of about the same length and seating capacity as the one-man, two-man cars. An average length for the two types is about 45 ft. and the average seating capacity is about forty-four. It is interesting to compare this size of car with the double-truck design prepared by last year's committee of the American Electric Railway Engineering Association on unification of car design, which has an over-all length of 42 ft. 1 in. with body 28 ft. 7 in. over all and platforms 6 ft. 9 in. long. The windows are spaced 2 ft. 5½ in. and there are eleven on each side. By adding one more window the length would be 44 ft. 6½ in. and seats for forty-eight passengers would be provided inside the car body. This is about the same as the average for the double-truck, one-man cars, or the one-man, two-man cars ordered last year.

The largest increase of passenger cars ordered last year as compared with preceding years was for inter-urban service. There were 427 of these as compared with 187 for 1922. There was also a large increase in the number of freight and express cars ordered for

interurban service. These figures show that the inter-urban roads were active in buying new rolling stock and this augurs well for their continued prosperity.

While much new rolling stock has been added railways have also been busy in remodeling old cars. A total of 1,256 cars were reported as being rebuilt. Of these 581 were remodeled for one-man and seventy-seven for one-man, two-man operation.

The Present Position of the Bus in the Railway Field

TWELVE hundred and seven buses are now being operated by 121 electric railway companies in a variety of services. This number has increased from forty-four companies and 300 buses since October, 1922. Thirty additional railways have definitely indicated to the JOURNAL that they expect to start operation of buses during 1924. And purchases of new buses during next year to the extent of at least 50 per cent of the present total are indicated, but it is probably safe so say that the number will double. Electric railways purchased 621 motor buses during 1923, according to the JOURNAL'S survey which is published in this issue on page 40.

Some of the leading men of the electric railway industry and the principal bus manufacturers believe that in time the electric railways will dominate the bus situation in its major operations and that the electric railways are to be the great market for buses. At the last national convention of the electric railways 24 per cent of all the exhibit space was occupied by buses and bus equipment.

The American Electric Railway Association has formally taken the position that all of the transportation requirements of any community should be furnished by one agency; that that agency should be the electric railway company; that it is the duty of the railways to study and consider the availability of every feasible unit or method for furnishing transportation service; that there is a field in which the bus can furnish service satisfactory alike in operation and economy; that the electric railways should be alive to the possibilities of bus operation, both to handle all the transportation needs of a community and to prevent wasteful competition; that traction officials should not allow an antagonism aroused by jitney competition to blind them to the fact that they must keep pace with developments in the transportation field if they expect to continue to be the recognized agency of transportation in a community; that the motor bus is needed to feed and supplement the rail lines, to open up new territory, and to round out and make complete the passenger transportation on the highways.

It was commonly agreed among railway men that the last convention of the American Electric Railway Association marked the turning point in the predominant sentiment of the railway men from one of antagonism toward the bus to one of appreciation that it is a new transportation tool which they may well endeavor generally to bring into use in its proper sphere. The desire to quash the bus by fair means or foul has now largely been replaced by a more constructive attitude of studying how best to capitalize on the new vehicle. To this end, committees of the American Electric Railway Association and the affiliated Transportation &

Traffic, Engineering, and Accountants' Associations are all working on various phases of the subject.

The president of the American Association recently said in public print that "as soon as the electric railway industry gets to the point—and I think it has reached that point now—where it will utilize the bus to the extent that seems advisable and necessary, then the *ELECTRIC RAILWAY JOURNAL* would be helping along the idea that it is an accepted practice of electric railways to utilize the bus" by publishing bus articles in the *JOURNAL*. Continuing, he said "and it will be in the best interests of the industry when that idea is generally accepted. It was too bad it was not accepted, in my opinion, two or three years ago. I think it would have saved a lot of grief and trouble that we may be a long time in remedying."

In view of all this, does it not appear obvious that the industry paper—*ELECTRIC RAILWAY JOURNAL*—should treat comprehensively the activities of the railways in taking up the bus?

Railway Operation of Buses to Be Treated in the "Journal"

BEGINNING with this issue, the *ELECTRIC RAILWAY JOURNAL* will publish more fully than heretofore articles dealing with the operation of buses by electric railway companies. By so doing, it is believed the present needs of the electric railways will be better served. The *JOURNAL* will be better able to record the extent and kind of bus service undertaken by the railways and to aid the railways by pointing out where and under what conditions the bus should be utilized.

Since *Bus Transportation*, offspring and associate of the *JOURNAL*, was created two years ago, the latter has carried only editorials discussing the broad economics and place of the bus, and brief news items telling of the inauguration of bus operation by railways. Papers on bus operation presented at railway association meetings have been briefly summarized in this paper, frequently with a notation that they would be published more fully in *Bus Transportation*.

Prior to the establishment of *Bus Transportation*, the early progress of the bus was treated to some extent in the *JOURNAL*, for this paper saw the bus as a useful ally or a troublesome competitor. At that time there was considerable resentment on the part of some railway men at seeing such articles in the paper they had been reading for nearly forty years and happily had come to feel was "their" paper.

While not wishing to incur the disapproval of its lifelong readers, the *JOURNAL* nevertheless was confident that the bus was coming and that a great service could be performed for both the railways and the independent bus operators by advocating its development along lines in keeping with the established principles of sound economics and regulation. So it was decided to treat bus matters in a separate but associated publication—*Bus Transportation*.

At the time of the establishment of this paper in January, 1922, fears were expressed by a few that the same publishers could not successfully produce a paper devoted to the electric railway interests and another to the bus interests. These fears, based on the idea that there was an ineradicable antipathy between bus and electric railway, have been found entirely groundless.

Bus Transportation has now been published monthly for two years, and it is generally accredited with having done a very constructive piece of work.

Preaching, like the *ELECTRIC RAILWAY JOURNAL*, the idea of co-ordination of all local means of transportation, and otherwise following along the same lines of editorial policy, it has undoubtedly been a steady-ing force in the direction of sound bus development. It is probably not too much to say that the policy adopted upon the establishment of *Bus Transportation* and strongly advocated by both that paper and *ELECTRIC RAILWAY JOURNAL* has had a great deal to do with the present reconciliation of what might have been antagonistic forces.

The rapid development of the bus and its acceptance as a transportation agent by many electric railway companies during the past two years call now for a more extensive treatment of the bus in the *JOURNAL*. So many electric railway companies now run bus services and so many others are contemplating doing so that it is evident that there has been a profound change in the attitude of the railway men toward the bus. The previous editorial gives a more definite summary of this evidence. Railway men are coming to take the position that they are "transportation men" and that if there is anything to the bus they are the ones who should make use of it. They want now to keep advised on what the industry is doing with the bus, and they expect the industry paper—the *JOURNAL*—to supply this information. Conforming with this need, the *JOURNAL* will undertake to do so from now on.

Bus Transportation will continue to be the all-bus paper, covering all important news and developments of the bus everywhere by whomever operated. *ELECTRIC RAILWAY JOURNAL* will treat only of such bus operation as is carried on by electric railway and affiliated companies. It will promote the utilization of the bus as an auxiliary of the railway in a co-ordinated transportation plan, for it believes thoroughly that the public can best be served—in fact, can be served satisfactorily only when all the transportation facilities of a community or territory are under a single management.

The *JOURNAL* will treat primarily the economics of the bus, the kinds of service in which railways put it to use, the conditions of such use, how it is co-ordinated with the railway service, questions of policy and such broad matters as regulation, taxation, etc., depending upon *Bus Transportation* for the technical material, such as detail bus design, bus maintenance, and the technique of bus operation in general.

From this it will be seen that the railway man who is operating buses and wishes to keep informed on all phases of bus operation and all developments of the bus will want to read *Bus Transportation* as well as the *JOURNAL*.

To start off on this program, the *JOURNAL* has undertaken to bring together a comprehensive summary of the present operation of buses by electric railways. A survey of the entire industry has been made to determine the number of railways that have taken up the bus and the kind of service in which they have placed it, as well as to learn the general feeling up to the present time about the advantages, limitations, and possibilities of the bus, as railway men view it. This summary, including a tabulation of the data, is published in this issue, beginning on page 5.

\$262,000,000 for New Plant and Equipment and Maintenance Materials

CITY and interurban electric railways of the United States will spend the sum of \$262,000,000 for new plant and equipment and for maintenance materials during 1924. Of this, the estimated expenditure for new plant and equipment, such as new cars, buildings, power apparatus, shop tools and track machines, new paving, new materials for track construction or reconstruction, various car devices, etc., amounts to \$150,000,000. This compares with \$180,000,000 for the similar expenditures actually made during 1923.

For materials and supplies for routine maintenance work, it is estimated that the electric railways in the United States will spend \$112,000,000 in 1924, as compared with actual expenditures of \$102,000,000 in 1923.

The total proposed expenditure of \$262,000,000 in 1924 compares with \$282,000,000 spent in 1923. These expenditures will be divided among the three main accounts of the standard A.E.R.A. classifications, as shown in the accompanying table.

From the estimates summarized herewith, it appears that the electric railways will expend some \$30,000,000 less for new plant and equipment in 1924 than they did in 1923. What this probably reflects is that the tremendous need for reconstruction and rehabilitation and new equipment in all departments which existed for the first few years subsequent to the war has in part been met, and that the program of expenditures is dropping back slightly to what is more nearly a normal program of replacement and improvement. This is probably particularly true of way and structures expenditures, which in this estimate shows the largest drop. The expenditures for new cars holds up fairly well on account of the extensive trend toward new cars of the one-man and one-man, two-man type. Similarly, the expenditures for power accounts is holding up large, probably on account of the extensive adoption of automatic substation equipment.

HOW THE FIGURES WERE OBTAINED

The JOURNAL undertook last year for the first time to get an estimate of the budget of the industry covering expenditures to be made for new plant and equipment. Information was requested from the 197 Class A companies as to 1922 and 1923 expenditures. Forty-seven companies supplied figures as to their actual 1922 expenditures and their proposed 1923 expenditures. The figures for the entire industry were then calculated from the summaries of these forty-seven companies, the estimates being based proportionately on track mileage and cars operated. Both track and cars were used because neither alone gives a proper measure of the buying power of the industry.

This year, similar information was requested from the same list of companies and fifty supplied their actual expenditures for 1923 and proposed expenditures for 1924. From these the corresponding figures for the entire industry were calculated as before. This new figure for 1923 provides a check on the budget estimate published in the JOURNAL last year.

Based on what the roads estimated they would expend

during 1923 for new plant and equipment, an industry budget of \$240,000,000 was estimated. Based on what the roads report as having actually expended during 1923 in the present canvass, the figure is \$180,000,000. While this discrepancy is large, it can probably be accounted for in major part by two things.

In the first place, the JOURNAL asked for separate

Electric Railway Journal's Estimate of Industry Expenditures During 1923 and 1924

For New Plant and Equipment

	1923	1924
Way and structures	\$74,000,000	\$53,000,000
Equipment	78,000,000	70,000,000
Power	28,000,000	27,000,000
Total	\$180,000,000	\$150,000,000

For Maintenance Materials and Supplies

	1923	1924
Way and structures	\$42,000,000	\$44,000,000
Equipment	44,000,000	53,000,000
Power	16,000,000	15,000,000
Total	\$102,000,000	\$112,000,000

Total for New Plant and Equipment and Maintenance Materials

	1923	1924
Way and structures	\$116,000,000	\$97,000,000
Equipment	122,000,000	123,000,000
Power	44,000,000	42,000,000
Total	\$282,000,000	\$262,000,000

figures on expenditures for maintenance materials and supplies this year, but did not ask for these at all last year. It is quite possible that some of the companies included maintenance materials in their figures for 1923, and segregated them this year. There is opportunity for some confusion here. It is impossible definitely to define the two classifications. It is not a division between expenditures for capital account and expenditures for operating account that the JOURNAL was seeking, but rather what the railways are going to spend during the year, so far as it means purchasing of new materials and equipment from the manufacturers, regardless of the account to which it is charged.

The second item in accounting for the difference is that it is known that a number of companies planned to do considerably more work in 1923 than they were able to get completed, so that the actual expenditures reported reflect this. Furthermore, the budget of a company often provides for the purchase of new equipment which may not be delivered on account of delays until the following year and therefore the expenditure is not made, as planned in the budget.

The figures reported by the companies last year, covering actual expenditures for 1922 for new plant and equipment, and expanded for the industry estimate were: Way and structures, \$85,000,000; equipment, \$38,000,000; power, \$28,000,000; total, \$151,000,000.

It is perhaps worth noting that the figures included herewith covering the expenditures for maintenance materials and supplies represent the first definite attempt, it is believed, to find out what the electric railways spend annually for routine maintenance materials.

Extent and Kind of Bus Operation by Electric Railways

A Summary of the Methods of 121 Companies Based on a Nation-Wide Survey of the Industry Shows that Feeder Service Is the Most Common Form of Operation—Great Expansion Is Planned for 1924—The Railway, However, Remains the Cornerstone of the Transportation System in the General Opinion, Though Finding the Bus Useful as an Auxiliary

AS THE result of a nation-wide survey just completed by the **ELECTRIC RAILWAY JOURNAL**, it has been found that the electric railways in the United States and Canada are now operating more than 1,200 motor buses. This is nearly three times the number which were reported to be in operation during the year 1922, and is an increase of 80 per cent over the number reported at the time of the American Electric Railway Association convention in October, 1923. A year ago there were fewer than fifty railways engaged in bus operation, while now there are 121. Much of this expansion has come during the past few months, a number of railways having inaugurated bus service since Nov. 1. Besides the companies which are already engaged in bus operation, thirty other electric railways have signified their intention of commencing such operation during the coming year. Many of the companies now operating buses are planning during 1924 to add materially to the number in use.

Bus operation is handled in a number of cases by subsidiary companies controlled by the railways. On the other hand an equal number of railways operate buses directly in their own names, so that there seems to be no general rule in this matter. In addition to the buses mentioned in the foregoing paragraph there are known to be several hundred operated under the indirect control of railway companies but which for various reasons are not included in their reports.

Many classes of service are comprised in the bus operations of the electric railways. By far the most common service, however, is that of feeder to the railway lines. A number of companies have inaugurated bus service instead of extending their tracks into new territory. Bus service has replaced railway service in some cases when an extensive program of track and paving rehabilitation would have had to be undertaken in order to continue railway operation. In some cases buses have been used for operation on crosstown feeder routes connecting with several railway lines. The complete substitution of bus service for railway service in small towns has been tried by two or three companies. Interurban and boulevard service are also included among the various uses to which the electric railways are putting the bus, but instances of such operation are not numerous.

When buses are operated as feeders to the existing street railway systems the same fare is usually charged as is charged on the cars. In many such cases free transfers are issued interchangeably. Where buses are operated on boulevard service the fare is almost invariably higher than the local railway rate and ordinarily there are no transfers issued. This same situation as to fares and transfers prevails also in some places

where the bus is used to furnish transportation to sparsely settled districts where traffic demands are not great enough to justify extensions to the railway lines.

Officials of electric railways operating buses seem in general to be well pleased with the results accomplished by such operation. While buses are in many cases not directly profitable to the company, they nevertheless furnish a necessary service at less cost than could be done in any other way. The nature of the territory through which these routes are operated is usually such that no immediate profit can be expected from any transportation service. The railways have, however, not only acquired much public good will by the inauguration of bus service in the sparsely settled districts but to a great extent have also protected their own interests by forestalling possible competition.

AUXILIARY OR FEEDER SERVICE CAN BEST BE PROVIDED BY THE BUS

A few railway companies have done very well and are making a direct profit from the operation of motor buses. This is in most cases the result of comparatively high fares for short hauls. The consensus of opinion expressed by those having experience is that the bus cannot replace the electric railway for ordinary city service. Nearly all railway operators find it an unsatisfactory vehicle for mass transportation, but say that in auxiliary or feeder service it has a distinct and important place.

A point brought out by the remarks of some railway officials concerning the bus is to the effect that the bus should more properly be referred to as a "coach." It is thought that the word "bus" inadequately describes the attractive and commodious vehicles now widely used. This practice is being followed by the Pennsylvania-Ohio Electric Company, which operates its buses under the name of the Pennsylvania-Ohio Coach Lines, and always refers to them as coaches. Some other companies do likewise.

Indications are that bus operations by electric railways will increase greatly during the coming year. As already mentioned, thirty companies have definitely stated that they are contemplating the inauguration of bus service. The companies which are now operating buses are planning the purchase of much new equipment in 1924. In general an addition of about 50 per cent of the present number of buses will be made to the equipment of the railways operating them. One large company which spent \$200,000 on buses in 1923 intends to expend an additional \$100,000 during the coming year. Two other companies operating more than thirty buses now plan to increase the number 100 per cent next year.

The figures in the accompanying table were compiled from the answers received by the ELECTRIC RAILWAY JOURNAL to a questionnaire sent to all the electric railways throughout the country, and from other data in the JOURNAL files. The experiences of various companies are given in the following paragraphs:

NEW ENGLAND STATES

The Connecticut Company, New Haven, operates forty-seven buses on various lines in city districts otherwise unserved, in rural districts where no other means of transportation is available, and also in rural districts where short routing gives facilities superior to the rail line. In the city the rates are the same as on the railway, but in the outlying territories bus fares are higher. In the opinion of the company the bus fills a very necessary place as an adjunct to existing rail lines, and also meets a public desire for a better service over some routes at a higher rate.

The Eastern Massachusetts Street Railway, Boston, operates thirty-one buses on various routes throughout its territory. The company says: "In substantially every instance our buses are running on lines formerly served by our electric cars. In most cases the buses were put into service some time after the cars had been stopped on account of poor condition of track and poor earnings. On only two routes were the buses put in at the same time that the cars were stopped. Most of our operation is in small towns or between small towns, and in all cases in very light riding territory.

"The rate of fare on our buses is approximately the same as on street cars in similar territory on our property. We do not generally use transfers on this system, but in some special cases they are issued between cars and buses. The rates on the buses vary in different places over a wide range, but 2½ cents a mile is about typical of the rate on the suburban lines. We have no real interurban runs.

"Our buses have operated quite satisfactorily and in some divisions have demonstrated that they can be operated at a reasonable cost. Our principal difficulty is poor earnings on the lines where they are operated. The operation of buses has been a satisfactory way out of the problems presented by the necessity otherwise of completely rebuilding a line where riding is light. Buses have been very easily able to take care of the volume of business offered on the lines where we are operating them. We have had no bus experience with particularly heavy traffic."

The Boston Elevated Railway has had buses in service since the early part of 1922, and the plans of development call for buses as a regular part of its service. In all cases these buses are used in the suburban districts, in several instances to supply service on routes formerly operated by trolley. The change in these cases was usually made for economic reasons, it being thought that the bus service would result in less loss than that by trolley car. There is no competitive jitney service in the Boston Elevated territory.

So far as fares are concerned, the buses form an integral part of the system and give and accept transfers from trolley cars under conditions where transfers would have been given and honored if the route was operated by trolley cars. Bus operators on the Boston Elevated system are classed with the operators of the trolley cars and receive the same wages, including the regular bonus for one-man operation, as all buses are one-man operated.

The Springfield Street Railway, Springfield, Mass., operates four buses in feeder service. Bus receipts are less than the actual operating costs plus depreciation, interest on investment, etc. The operation is primarily for the purpose of protecting the railway investment.

The United Electric Railways, Providence, R. I., operates twenty-eight buses in intercity express service and also in routine local passenger service. On the basis of earnings bus operation is paying well on certain routes throughout all months of the year. Certain other routes, on account of local conditions, have such variable traffic that operating deficits occur periodically. Unquestionably, the bus operation supplies a service demanded at a lesser loss than would be incurred through railway operation. Moreover, the company feels that bus operation protects the railway investment and discourages independent jitney operation over new routes.

The greatest advantage apparent in bus operation is the relatively low capital investment required to render a service adequate to meet small traffic demands. In the opinion of the company the greatest limitation of the bus lies in its inability to compare with the electric railway car for extremely heavy passenger demands.

The Twin State Gas & Electric Company, Brattleboro, Vt., has discontinued railway service altogether and now provides the public with transportation entirely by means of buses. These buses operate on a thirty-minute headway, an improvement over the previous street car schedule.

EASTERN STATES

The Capital Traction Company, Washington, D. C., owns and operates eight buses. Three bus lines are operated as extensions to the existing street railway system. One line replaces the trolley service formerly furnished by another small company, and one bus is operated in place of an owl car. The rates of fare on street railways and buses in the District of Columbia are the same and transfers are issued at the rate of 2 cents each except where buses have replaced existing trolley service. In these instances all transfers are free.

Bus operation by this company has so far been expensive. Since operations began the average revenue per bus mile has been 8.22 cents, while the average expense was 20.73 cents. The latter figure represents only what is entered on the books as bus expense and does not include overhead. The company believes, however, that the buses are well worth their cost as they furnish service which the public demands and which would cost much more to furnish by means of extensions to the electric car lines.

The Capital Traction Company has had no experience in the handling of heavy traffic by buses but is firmly of the opinion that the bus cannot compete with the electric railway for mass transportation.

The United Railways & Electric Company, Baltimore, one of the pioneers in bus operation, now runs thirty-six buses under the name of the Baltimore Transit Company. These buses are operated in city service, as an alternative to the street cars in two instances, and on two more routes as feeder service. On the feeder routes the fare is the same as on the railway, but on the alternative city routes the bus fare is 10 cents. In the first case transfers are exchanged and in the second they are not.

The company expresses its opinion of bus operation

as follows: "We believe that buses have a field for operation as a supplement to the street railway system, either as an alternative service, as feeder service, or as pioneer service, so called. We feel that the operation of buses in Baltimore has been justified and that moreover they have helped us to maintain our position as the corporation supplying transportation to all sections of the community.

"Our experience as to the advantages and limitations of the bus is in general similar to that of other companies. It is not a vehicle adapted to handling mass transportation, but has advantages for furnishing superior service on the basis of a seat for each passenger, thus in effect being a kind of limited service as this word is understood in connection with railroad service."

The Public Service Railway, Newark, operates two bus lines in the city of Camden and one feeder line in sparsely settled territory. On one of the former, a crosstown route, the bus has supplanted the railway service altogether. This is a short line crossing several street car lines and connecting with the ferry. The same fare is charged as on the railway, 5 cents, and no transfers are issued. On another route the buses have partly supplemented the railway service and serve also to some extent as an extension to the line. The feeder bus route connects a small town about a mile from the railway with an interurban car line. Results of these operations are considered to have been entirely satisfactory.

The New York State Railways operates buses in Rochester and in Utica. In the former city they are operated in a section not otherwise served and connect with one of the railway lines. The fare is divided into three zones, the rate within the city zone being 7 cents with transfer, 3 cents between the city line and the end of the first zone and 15 cents to the end of the route with transfer privilege. A reduced rate ticket is also in effect. In Utica the fare on the buses is 7 cents. According to the company, the operation of buses seems to be working out very satisfactorily.

The Altoona & Logan Valley Electric Railway, Altoona, Pa., operates seven buses under the name of the Logan Valley Bus Company. There is a fare differential in favor of the railway of 3 cents, the bus fare being 10 cents and the railway fare 7 cents. Free transfers are issued from the bus to the railway, but a charge of the additional 3 cents is made for a transfer from the railway to the bus. This service has been in operation only a few months, and although business is gradually picking up it is still more in the nature of an accommodation to the territory served than a source of profit to the railway. However, the company believes that the bus is a good feeder to the trolley from points where service is required but where traffic is not sufficiently heavy to warrant the building of a railway line.

The Conestoga Traction Company, Lancaster, Pa., operates buses under the name of the Conestoga Transportation Company, at the same fare as the railway. No transfers are issued, however, and a separate fare is collected by each company. The railway says: "Bus operation seems satisfactory to the public and avoids the expenditure of a larger sum of money by the street car company to construct a car line through undeveloped territory. The bus operation thus far has been conducted at a slight loss, which we feel is about offset by the increase in passengers riding on the electric railway lines."

The Citizens Traction Company, Oil City, Pa., operates two bus lines, one being a city line and the other an interurban line. On the city line the railway fare is 8 cents and the bus fare 10 cents, and transfers are issued. In interurban service the railway fare is approximately 2½ cents a mile, whereas the bus fare is 4 cents a mile. The company thinks that bus operation is not satisfactory on an earnings basis. It does, however, provide service demanded at a lower cost than the railway could do in an outlying district. Bus service is also important in protecting the railway investment. The experience of this company leads to the belief that the bus is not suited for mass transportation and is advantageous only where the traffic is light.

The Philadelphia Rapid Transit Company operates fifteen buses under the name of the Philadelphia Rural Transit Company. It is expected that five additional buses will soon be placed in service. This operation is auxiliary to the street railway service, although a 10-cent fare is charged instead of 7 cents. The length of time this route has been operated is so short that no definite conclusions have yet been reached by the company concerning the merits of bus operation.

The West Chester Street Railway has, through its subsidiary, the Peoples Transportation Corporation, acquired control of all the motor bus routes in southern Chester County, connecting points in this district with the cities of Chester, Pa., and Wilmington, Del., and a co-ordinated plan of railway and motor bus transportation for the whole district is now being worked out.

Another railway which formerly operated from West Grove to Kennett Square, a distance of 7½ miles, and thence 14 miles southward to the outskirts of Wilmington, ceased operation in April, 1923. Most of the traffic had been on the Kennett-West Grove division, the earnings of which practically carried the whole property. This portion of the line has now been taken over by the West Chester Street Railway. The remainder of the old road has been sold and the tracks taken up, the district being served by buses of the West Chester Company.

The York Railways, York, Pa., operates three buses under the name of the York Transit Company. One bus line is a feeder to an 8-mile interurban line. The other operates in territory not served by the railway. The line operating as a feeder has been decidedly unprofitable, even though additional travel on the railway is considered. Unless traffic increases so that the bus line will be self-supporting, in the near future application will be made for its discontinuance. The second line has not been in operation sufficiently long for the company to be able to pass judgment upon its success. This railway says:

"We cannot find any physical advantages of the bus over the electric car, but bus lines when tried and found unprofitable do not, of course, entail the enormous loss which would occur in the construction and operation of cars on tracks. The bus has its advantages under certain conditions, and in many instances can no doubt be used profitably as a feeder to the existing railway lines."

The Monongahela Railway & Power Company, Fairmont, W. Va., recently purchased the Marietta Bus Company, which will be continued under the name of the Pioneer Transport Company. It is planned to furnish service in connection with the street railway operation in the city of Marietta. Under the present

Summary of Bus Operation by Electric Railway Companies

Name of Railway	Name of Bus Subsidiary	Number of Buses	Date Operation Began	Kind of Service	Rate of Fare		Transfer to Railway
					Bus	Railway	
CONNECTICUT							
Danbury & Bethel St. Ry., Danbury.....		5	Aug. 1921	2&3	10	10	Free
Connecticut Co., New Haven.....		47	July 1921	2-3-4-5	10	10	Free
Groton & Stonington St. Ry., Norwich.....		5	Nov. 1922	2-3-5	05	05	None
Hartford & Springfield St. Ry., Warehouse Point		2	Dec. 1923	2	10	10	....
MASSACHUSETTS							
Eastern Mass. St. Ry., Boston.....		31	Jan. 1922	2-3-4-5	10	10	Free
Boston Elevated Ry.....		31	Feb. 1922	2-3-4	05	10	None
Connecticut Valley St. Ry., Greenfield.....		1	Nov. 1922	5	10	10	None
Northern Mass. St. Ry., Greenfield.....		1	Aug. 1922	2	05	10	None
Holyoke St. Ry.....		3	July 1921	3	06	06	None
Union St. Ry., New Bedford.....		3	Dec. 1923	4	05	05	....
Plymouth & Brockton St. Ry., Plymouth.....		2	Feb. 1923	2	07	07	Free
Springfield St. Ry.....		4	Feb. 1923	2	07	07	Free
RHODE ISLAND							
United Elec. Rys., Providence.....		28	July 1922	3-4-5	06	06	Free
VERMONT							
Twin State Gas & Elec. Co., Brattleboro.....		3	Aug. 1923	6	10	Discontinued	
DISTRICT OF COLUMBIA							
Capital Traction Co., Washington.....		8	Feb. 1923	2	08	08	02
Washington Ry. & Elec. Co.....		17	May 1922	2-3-4	08	08	Free
Washington-Virginia Ry.....		4	Jan. 1922	2	05	05	Free
MARYLAND							
United Rys. & Elec. Co., Baltimore.....	Baltimore Transit Co.....	36	 1915	2&3	10	07	Free
Potomac Edison Co., Cumberland.....		2	Jan. 1924	3	10	07	....
Potomac Public Service Co., Frederick.....		15	 1923	5	10	08	....
NEW JERSEY							
Millville Traction Co.....		1		2			
Morris County Traction Co., Morristown.....	Dover Bus Co.....	1	July 1923	2	05	07	02
Public Service Ry., Newark.....	Public Service Transp. Co.....	27	July 1922	2&4	05	05	None
Trenton & Mercer County Traction Corp.....	Central Transp. Co.....	5	Sept. 1923	3	08	08	01
NEW YORK							
International Ry., Buffalo.....	International Bus Corp.....	3	Sept. 1923	2	07	07	Free
Jamestown St. Ry.....		11	Mar. 1922	3	08	08	Free
Orange County Traction Co., Newburgh.....	Newburgh Pub. Service Corp.....	32	Mar. 1922	6	07	Discontinued	
Niagara Gorge R. R., Niagara Falls.....	Niagara Gray Bus Line.....	10	1921				
N. Y. State Rys. (Rochester Lines).....		3	Nov. 1923	2	07	07	Free
N. Y. State Rys. (Utica Lines).....	Utica Ry. Co-ordinated Bus Line.....	4	Oct. 1923	2	07	07	Free
PENNSYLVANIA							
Altoona & Logan Valley Elec. Ry.....	Logan Valley Bus Co.....	7	July 1923	2	10	07	Free
Schuylkill Ry., Girardville.....	Schuylkill Transp. Co.....	6	July 1922	3	10		
Johnstown Traction Co.....	Traction Bus Co.....	3	Dec. 1922	2			
Conestoga Traction Co., Lancaster.....	Conestoga Transp. Co.....	2	April 1923	2	06	06	None
Lewistown & Reedsville Elec. Ry.....	Lewistown Transp. Co.....	2	Jan. 1924	2	06	06	Free
Beaver Valley Traction Co., New Brighton.....		2	June 1923	2	10	05	Free
Citizens Traction Co., Oil City.....	Citizens Transit Co.....	4	July 1921	2&5	10	08	Free
Philadelphia Rapid Transit Co.....	Philadelphia Rural Transit Co.....	20	Sept. 1923	2	10	07	03
Pittsburgh, Harmony, Butler & New Castle Ry., Harmony.....		3	April 1923	5			
Jefferson Traction Co., Punxsutawney.....		3					
West Chester St. Ry.....	Peoples Transportation Co.....	14	1923	5			
York Rys.....	York Transit Co.....	3	Aug. 1923	2&5	10	07	Free
WEST VIRGINIA							
Wheeling Public Service Co.....		4					
Monongahela Power & Ry., Fairmont.....	Pioneer Transport Co.....	8	Jan. 1924	2&5	07	07	None
Princeton Power Co.....		1	 1923	2			
ILLINOIS							
Centralia Traction Co.....		1					
Chicago & West Towns Ry., Oak Park.....		2	Jan. 1923	2	10	10	Free
East St. Louis Ry.....		4	Mar. 1923	4	08	08	Free
Chicago, North Shore & Milwaukee R. R., Highwood.....		27	Aug. 1922	2&5	Ticket 3.6c mi. 4c. mi.	3c. mi. 3.3c. mi.	
Chicago & Joliet Elec. Ry., Joliet.....	Chicago & Joliet Transp. Co.....	2	April 1923	5	15		None
Rockford City Traction Co.....		6	April 1922	2	10	10	Free
Tri-City Ry., Rock Island.....		2	Nov. 1923	2	10	10	Free
INDIANA							
Gary St. Ry.....		7	May 1922	3	10	10	Free
Gary & Valparaiso Ry., Gary.....		1	Dec. 1922	5			
Chicago, South Bend & Northern Ind. Ry., South Bend.....		3	Sept. 1923	3	08	05	Free
IOWA							
Des Moines City Ry.....		6	 1923	2			
Dubuque Elec. Co.....		3	June 1914	2	10	08	None
Waterloo, Cedar Falls & Northern Ry., Waterloo.....	Cedar Valley Road.....	6	Jan. 1923	5	15		Free
KENTUCKY							
Louisville Ry.....	Kentucky Carriers, Inc.....	12	June 1923	1&3	10		
MICHIGAN							
City of Detroit (Dept. St. Rys.).....		5*	Nov. 1923	2	06	06	None
Grand Rapids Ry.....		6	April 1923	2	10	10	Free
Houghton County Traction Co., Houghton.....	Houghton City Bus Co.....	3					
Michigan United Rys., Jackson.....		11	Mar. 1922	2&3	08		Free
Muskegon Traction & Lighting Co.....		1	Nov. 1923	4	10	10	Free
Saginaw-Bay City Ry.....	Saginaw Transit Co.....	25	Nov. 1923	3			
MINNESOTA							
Mankato Elec. Traction Co.....		2	Sept. 1923	5	07	05	
Twin City Rapid Transit Co., Minneapolis.....		1	Dec. 1921	2	06	06	Free
MISSOURI							
Springfield Traction Co.....		13	Aug. 1921	3	05	07	02
OHIO							
Northern Ohio Traction & Light Co., Akron.....	Northern Transit Co.....	17	Mar. 1922	2&5	05	05	Free
City of Ashtabula (Div. St. Rys.).....		1					
Steubenville, E. Liverpool & Beaver Valley Trac. Co., E. Liverpool.....	Valley Motor Transp. Co.....	2	Aug. 1923		10		None

*Operated under agreement with Detroit Motorbus Company.

Summary of Bus Operation by Electric Railway Companies—(Continued)

Name of Railway	Name of Bus Subsidiary	Number of Buses	Date Operation Began	Kind of Service	Rate of Fare		Transfer to Railway
					Bus	Railway	
OHIO—(Continued)							
Hocking-Sunday Creek Trac. Co., Nelsonville..		1	 1922	..	05	03	....
Columbus, Newark & Zanesville Elec. Ry.,							
Columbus.....	C. & Z. Transp. Co.....	13	Jan. 1923	2&5	9 @ 50	9 @ 50	Free
Springfield St. Ry.....		1	Nov. 1923	2	07	07	Free
Indiana, Columbus & Eastern Trac. Co.,							
Cincinnati.....	Dayton & Columbus Transp. Co.....	15	Feb. 1923	2&5	3c. mi.	..	....
Community Traction Co., Toledo.....		4	.....	..	3c. mi.	..	....
Penn.-Ohio Elec. Co., Youngstown.....	Akron-Youngstown Bus Co.....	26	Aug. 1922	2&5	10	10	Free
Youngstown Municipal Ry.....	P-O Coach Lines Co.....	31	Sept. 1922	2	08	08	01
Youngstown & Suburban Ry.....	Youngstown & Suburban Transp. Co.	4	April 1923	5	2.4c. mi.	2.8c. mi.	Note
WISCONSIN							
Wisconsin Public Service Corp., Green Bay....	Riverview Motorbus Co.....	3	 1922	5	10	07	Free
Wisconsin Gas & Electric Co., Kenosha.....		6	.....	2	07	07	Free
Milwaukee Elec Ry. & Lt.....	Wisconsin Motor Bus Lines.....	100	Aug. 1919	1-2-5	10	07	None
Eastern Wisconsin Elec. Co., Oshkosh.....		8	Aug. 1922	5	3.5c. mi.	08	Free
Wisconsin Valley Elec. Co., Wausau.....	Valley Transit Co.....	4	Nov. 1921	6	10	Discontinued	....
	Merrill Bus.....						
ALABAMA							
Birmingham Ry., Lt. & Power Co.....		4	Oct. 1923	2	07	07	Free
ARKANSAS							
Arkansas Central Power Co., Little Rock.....		1	Nov. 1923	2	..	..	....
Intercity Terminal Ry., No. Little Rock.....		12	 1922	3	06	..	....
MISSISSIPPI							
Vicksburg Light & Traction Co.....		2	Oct. 1923	2	07	07	Free
SOUTH CAROLINA							
South Carolina Gas & Elec. Co., Spartanburg..		4	Sept. 1923	6	05	Discontinued	....
CALIFORNIA							
Bakersfield & Kern Elec. Ry., Bakersfield....		5	May 1915	2	05	05	Free
Los Angeles Ry.....	Los Angeles Motor Bus Co.....	100	Oct. 1923	1-2-3-4	10	05	Free
Pacific Elec. Ry., Los Angeles.....	Pacific Elec. Land Co.....	102	 1917	2&5	06	06	Free
San Francisco-Oakland Terminal Rys., Oakland		4	May 1921	2	3c. mi.	2.75c. mi.	Free
Pacific Gas & Elec. Co., Sacramento.....		4	 1922	2	06	06	....
San Diego Elec. Ry.....		3	Nov. 1922	2	05	05	Free
Municipal Ry. of San Francisco.....		8	Feb. 1918	2	05	05	Free
Peninsular Ry., San Jose.....		3	Sept. 1922	2	10	06	....
Santa Barbara & Suburban Ry.....		6	Jan. 1917	2	08	08	Free
Stockton Elec. R.R.....		3	 1915	2	..	..	....
KANSAS							
Kansas Elec. Power Co., Lawrence.....		2	Aug. 1923	3	08	08	Free
Salina St. Ry.....		1	 1920	..	10	..	....
NEW MEXICO							
City Electric Co., Albuquerque.....		1	Dec. 1921	3	07	07	Free
OKLAHOMA							
Tulsa St. Ry.....		23	July 1922	3	07	07	Free
Okmulgee Traction Co.....		3	 1920	3	10	..	Free
SOUTH DAKOTA							
Sioux Falls Traction System.....		5	May 1923	2	10	06	Free
TEXAS							
Eastern Texas Traction Co., Beaumont.....		1	Dec. 1923	2	10	..	....
Northern Texas Traction Co., Fort Worth....	Fort Worth Auto Bus Co.....	8	May 1917	2	07	07	Free
San Antonio Public Service Co.....		10	July 1923	3	06	06	Free
UTAH							
Utah Light & Traction Co., Salt Lake City....		2	Oct. 1923	4	10	..	....
WASHINGTON							
Puget Sound International Ry. & Power Co.,							
Everett.....		17	Dec. 1922	5	..	..	....
Pacific Northwest Traction Co., Seattle.....	Thompson-Smith Transp. Co.....	13	July 1921	5	3c. mi.	..	....
Seattle Municipal Street Ry.....		10	Nov. 1919	2	10	10	Free
Seattle & Rainier Valley Ry., Seattle.....		2	.....	2	05	10	None
Pacific Traction Co., Tacoma.....		2	July 1923	5	..	..	....
Tacoma Ry. & Power Co.....		2	Feb. 1923	2	10	..	Free
CANADA							
British Columbia Elec. Ry., Vancouver.....		2	April 1923	2	6 @ 35	6 @ 35	Free
Toronto Transportation Commission.....		15	Sept. 1921	2	07	07	Free
Winnipeg Elec. Ry.....		11	May 1918	2	07	07	Free
Montreal Tramways.....		2	Nov. 1921	2	07	07	Free
Nova Scotia Tramways & Power Co., Halifax...		2	.....	..	..	..	....
PANAMA							
Panama Elec. Co., Panama.....		2	.....	..	..	..	....
CLASSIFICATION OF SERVICE							
1—Boulevard; 2— Rail line extension; 3— New route to city center; 4—Crosstown Auxiliary; 5—Interurban; 6—Complete substitution							

CLASSIFICATION OF SERVICE

1—Boulevard; 2—Rail line extension; 3—New route to city center; 4—Crosstown Auxiliary; 5—Interurban; 6—Complete substitution

plan these buses will parallel street railway lines for part of the route over which they are operated, but will be so scheduled that they come in between the regular street cars.

In addition to bus operation in Marietta the company has purchased buses to be operated between the city of Morgantown, W. Va., and the terminus of the railway line at Rivesville, which is about 5 miles north of the city of Fairmont. It is planned to sell through transportation from Fairmont to Morgantown, transferring

passengers at Rivesville from the cars to the buses or vice versa.

CENTRAL STATES

The East St. Louis Railway operates four buses in crosstown service where no transportation facilities previously existed. The same rates are charged on the railway and on the buses and free transfers are issued. In every way the buses are on the same basis as the street cars. Bus operation has been as satisfactory as

was expected. It is a losing proposition, but the company is losing less money on the buses than if new tracks were built. Track could not be built at the present time except at excessive cost, and buses furnish a service which is helpful from the point of view of public relations.

This company finds no appreciable advantage in the bus, and the main reason for operating it is that the service can be rendered at a less cost. Over part of the route where the buses operate there is practically no pavement and this hampers operation to a considerable extent. Buses can be used only where pavement is good and it is impractical for the company to maintain the paving for buses where it is used also by all other automobile traffic.

The Chicago North Shore & Milwaukee Railroad operates twenty-seven buses in feeder and special service. The company states: "As a protection to our railway investment and as a feeder to our railway lines, we consider the motor coach operation satisfactory. We have also, to a limited extent, used the motor coach for an extension to our street railway service, thus supplying a demand for service at a very small investment and approximately no loss from operation even during the first few months of the development period."

The Chicago & Joliet Electric Railway, Joliet, Ill., operates bus service between Stateville, the site of the new Illinois State Penitentiary, and the city of Lockport, where connection is made with the interurban service for points between Joliet and Chicago. The fare is 15 cents and no transfers are issued between cars and buses. The company gives its opinion as follows:

"Our experience with the operation of the bus, notwithstanding the high rates of fare we charge, has not been financially satisfactory so far. This service was inaugurated to protect our territory, and since there is no intermediate traffic between the two terminals we have to rely upon the revenue from carrying state employees to and from the prison, together with the few visitors to convicts on the Honor Farm adjacent.

"Up to the present time about one-half of the convicts have been transferred from the old to the new penitentiary, but owing to the fact that the administration building is not yet completed, visitors are not allowed. It is expected that all prisoners will be in the new prison by June 1, next year, and the penitentiary will then be open to the public certain hours of the day. We believe that when this occurs our traffic on this bus line will warrant a reduction in fares and make the operation profitable."

The Chicago & West Towns Railway, Oak Park, Ill., operates buses in feeder service. The same rate of fare, 10 cents, is charged on both railway and bus with free transfers. Up to the present time this service has been operated at a loss.

The Tri-City Railway, Davenport, Iowa, operates one bus in Moline, Ill. This line gives city service only with transfer to and from the connecting railway line. It has not been in operation for a sufficient length of time to enable any conclusions to be reached concerning its success.

The Rockford City Traction Company, Rockford, Ill., operates six buses in city service. The same rates of fare are charged on the bus lines and on the railway with free transfers from buses to cars, and vice versa. In the opinion of the company, "It is very difficult to say much about the satisfactoriness and worth of bus operation. Our bus operation shows a net loss of about

\$2,500 per month. The operation costs are low, but the gross earnings are poor. As to the physical advantages and limitations of the bus, we have been able to handle all passengers who have offered themselves for transportation on our buses."

The Dubuque Electric Company, Dubuque, Iowa, was one of the pioneers in the bus business, having commenced this operation in June, 1914. Ten cents is charged on the bus, as against only 8 cents on the railway. No transfer privilege from bus to railway or vice versa is in effect. This company has found bus operation more satisfactory as a railway feeder or as a transportation medium on lines where travel is limited than as a substitute for ordinary street car operation. The use of the bus in sparsely settled territory is advantageous, since street car operation requires a large original investment and subsequent expenditures for repairs. Bus operation is satisfactory, if limited to routes without steep grades.

The Louisville Railway, Louisville, Ky., is operating buses on two routes under the name of Kentucky Carriers, Inc. One route is from the center of Louisville into the southern part of the town, where jitney competition in the past has been most active. The other runs through the southeastern section of the city. Neither route traverses the streets over which the cars of the Louisville Railway are operated.

At the present time the bus service is not earning more than 60 per cent of its operating cost. Very little improvement has been shown in earnings in spite of changes in operating schedules, and the company has recently announced that the present bus service will probably be abandoned unless the public supports it better. The fact that the idea of service by bus is somewhat new in Louisville and that the public has not become attracted to it is regarded as being partly responsible for the lack of patronage.

The City of Detroit, Department of Street Railways, has bus operation over a short route connecting with one of the railway lines. This service is not operated directly by the city, but by the Detroit Motor Bus Company on a mileage basis under the supervision of the railway. The rate of fare on this line and on the railway is the same, but no transfers are issued. The service has not been a paying proposition, but has been furnished because this particular locality was otherwise without transportation service.

The Grand Rapids Railway, Grand Rapids, Mich., operates six buses in city service. When these buses started operation the route was from the center of the town to an outlying district. The service was later discontinued and operation was begun as a feeder line connecting with the main line and issuing free transfers. The rate of fare on the railway and on the buses is the same. The experience of the company is that bus operation results in no financial gain. It is believed that the advantage of the bus is limited to the outlying districts where the cost of rails and overhead construction would be greater than the traffic warrants. Moreover, the bus cannot handle peak loads because of its limited capacity, and if sufficient bus equipment were provided it would congest the thoroughfares. The bus is believed to be satisfactory for feeder service.

The Springfield Traction Company, Springfield, Mo., operates thirteen buses in city service. The fare of the railway is 7 cents, while the bus fare is only 5 cents. Free transfers are issued from the street car

to the bus, but a 2-cent charge is made for transfer from bus to railway. The company considers that this service has been satisfactory in protecting railway investments. In a general way, it is thought that bus service is apt to be a success on smooth, well-paved roads, but is not likely to be successful over a rough pavement.

The Columbus, Newark & Zanesville Electric Railway operates twenty-eight buses in interurban service, connecting Dayton, Springfield, Newark, Zanesville, Urbana and Bellefontaine. The company says: "In order to get the proper background and to understand our motives in going into the bus business, it is necessary to speak in some detail of bus competition with which we have had to contend. Our first competition appeared some two and one-half years ago, giving hourly service with seven-passenger cars between Zanesville and Columbus. This was an association of individuals, each driver owning and operating his own bus and contributing a portion of his receipts to a general fund wherewith to pay for timetables, terminal facilities, advertising, etc. By the early part of 1923 parallel competition covered in some degree all of our interurban lines.

"As a means of combating this competition, we decided to go into the bus business on our own account. In making this decision we were influenced by the evident intention of the Ohio State Assembly to provide a bus law which would place all bus operation under the jurisdiction of the public utility commission, and it was the desire to get in under the wire which induced us to go into the bus business when we did. In this way, when the time came to pass around certificates of necessity, we would be in a position to claim some.

"Thus far we have succeeded in driving only one competing bus line out of business, namely, the line which at one time operated from Springfield through Urbana and Bellefontaine to Lakeview. We believe, however, that we have kept down the earnings of all other competitors to a point where they are not making enough money adequately to meet all charges. We know that several of our competitors are on a very unstable basis financially and have hopes that when their state and federal fees for 1924 come due they may be forced either to curtail or suspend operation.

"To the extent of having protected our railway investments by securing certificates of necessity, which enable us to compete with rival business, our service has been a success. Financially, it has been operated at a loss, and we can see no hope under present conditions and with the present type of buses whereby we can expect to make anything out of bus operation."

The Pennsylvania-Ohio Electric Company operates twenty-one buses as interurban coaches and five in city operation in New Castle. The buses in New Castle are operated at the same fare as the street railways, with free transfer between the two. This operation supplies a service for which there is popular demand at less expense than would be the case with the street railway.

Of the two divisions of the interurban bus operation one is for the purpose of perfecting railway investment and the other is in the hope of profit. The experience of this company with the bus has in general been satisfactory, although it is felt that there are still some mechanical problems to be solved.

The Youngstown Municipal Railway, Youngstown, Ohio, operates thirty-one buses in city service, accommodating sections of the city not previously served by

street railway lines. The rate of fare is the same on the railway and on the bus and free transfers are issued. The company says:

"Buses have a very particular field of operation, and in that field, which in our case is serving sections of the city not already served by railway cars, the buses have proved very satisfactory. It was impossible for this company to raise sufficient money to install street car lines in the rapidly growing sections of the city to which the buses operate. Jitneys were carrying people to and from these districts and, in addition, were carrying people to and from points along our car line. It was therefore necessary for us to take care of these outlying sections of the city if we were to have any success against the jitney competition.

"Buses also have a decided advantage in trying out new territory, in that if the service given is not appreciated buses can easily be transferred to some other sections of the city without loss on account of track and overhead being in place. To sum up, the buses were put in service to protect our existing railway investment. Although buses are advantageous in developing new territory, they have decided limitations in so far as handling mass transportation is concerned. One study made on this property in connection with the handling of industrial loads developed that it would require three buses for every street car during the peak period, which of course would be prohibitive."

The Youngstown & Suburban Railway operates four buses in interurban service. These are unusually commodious vehicles with individual wicker chairs, and the fare charged is 2.4 cents a mile with a minimum of 15 cents. Experience with buses to date has not been satisfactory, due to the high maintenance cost. The company believes that buses are as yet far from mechanically perfect, and these buses are being written off the books on a basis of a life of 200,000 miles.

The Milwaukee Electric Railway & Light Company operates 100 buses in interurban service and in de luxe city service under the name of the Wisconsin Motor Bus Lines. In addition, a number of bus lines are operated as feeders to the railway system. On feeder lines the same fare is charged as on the railway, with free transfers, while on the de luxe line the bus fare is 10 cents with no transfer privilege.

Bus service is being operated to supply a public demand for this type of transportation, to protect the railway investment and to avoid the necessity of expensive railway construction until such time as it is found that the traffic justifies it. The company reports:

"Our experience has indicated that while the motor bus is desirable from the point of view of flexibility, it has a number of limitations, such as higher cost of maintenance and operation, more rapid depreciation and inability to handle overloads as well as electric railway equipment."

The Wisconsin Valley Electric Company, Wausau, Wis., acquired the Merrill Railway in the fall of 1915. This property included 1½ miles of electric street railway which had been losing money ever since it was put in operation in 1889. The cars were in a deplorable condition, as was also the overhead system. The tracks had been rebuilt a few years previous to the time of the purchase, but were very poorly constructed and rehabilitation would have required an expenditure of approximately \$40,000. In a city the size of Merrill, which has a population between 8,000 and 9,000, it was

thought that it would be impossible to earn even operating expenses. The company therefore decided to replace the electric railway service 100 per cent with bus service.

Three buses were purchased and put in operation in November, 1921, two buses being required to give fifteen-minute service over the same route as the electric cars had been formerly operated. Later this line was extended, so that instead of the 1½ miles originally operated there are now 2½ miles. An additional bus was purchased in July, 1922, and placed in interurban service, as was also one of the original buses. There was not patronage enough, however, to keep these interurban lines in operation, and when the highways became bad in the fall they were abandoned. Operation is now confined exclusively to the city of Merrill.

Financially, the bus operation has not been a profitable venture, but the company has lost less money than would have been the case if electric cars had been continued. The service at least carries itself, which is better than the railway used to do, and at the same time the public is receiving better transportation. The latter factor is advantageous from the point of view of public relations.

SOUTHERN STATES

The Birmingham Railway, Light & Power Company, Birmingham, Ala., operates a shuttle bus line in accordance with an agreement with the city to furnish service on a route previously operated by jitneys. Buses were selected as the lesser evil with respect to losses.

The Vicksburg Light & Traction Company, Vicksburg, Miss., inaugurated bus service in order to avoid an investment of \$40,000 for street paving. Track was removed and buses purchased. This company finds the revenue per mile on the buses to be much greater than with the street cars. Furthermore, the maintenance of track and overhead construction has been eliminated.

The South Carolina Gas & Electric Company began operation of motor buses in September of this year instead of electric street railway cars in the city of Spartanburg. It has found the buses to be a very satisfactory substitute for the electric cars. The expenses, however, are somewhat greater than the income for several reasons. First, the fare is only 5 cents, and second, there are not enough buses to accommodate the traffic and to provide adequate schedules. The company is of the opinion that the motor bus can be substituted successfully for the electric street car in cities the size of Spartanburg, provided that the rate of fare be fixed at 8 cents or 10 cents in the city or per zone for suburban transportation.

WESTERN STATES

The Bakersfield & Kern Electric Railway, Fresno, Cal., has operated buses since May, 1915, in connection with the regular railway service, but has found them to be unsatisfactory.

The Pacific Electric Railway and the *Los Angeles Railway* co-operate in furnishing bus service in the Los Angeles district under the name of the Los Angeles Motorbus Company. There are now three routes in operation covering a total of 27 miles. A crosstown bus line extends from Hollywood, on the north, across the western portion of the city of Los Angeles to Slauson Avenue on the south, a distance of 11 miles. Another bus line operates between Hollywood and the business district of Los Angeles, a distance of 10 miles. From the northern part of Hollywood to the center of

Los Angeles a third route covering a distance of 6 miles has been established. These three lines require a total of approximately seventy buses.

The local fare in the Hollywood district is 6 cents, while the through bus fare over these routes is 10 cents, carrying with it the privilege of transferring to the street car lines of the Pacific Railway and the Los Angeles Railway.

One railway line in the city of Pasadena bus service has been substituted for trolley service. This was done because an expenditure of \$350,000 would have been necessary to rebuild the tracks if the car line were to be continued. Railway service was discontinued temporarily and bus service installed. Indications are that bus service will remain permanently because travel on this route is not very heavy. Forty-five buses are being operated by the railway in Pasadena. Together with shops and garage facilities this involves a total bus investment in the city of about \$500,000.

In addition to the bus service in the city of Pasadena and in Los Angeles the Pacific Electric Railway operates feeders or auxiliary bus lines as part of its railway system in the cities of Santa Ana, Alhambra, Beverly Hills, Glendale, San Bernardino and Redlands. About fifty buses are required for this service.

In a great many instances the bus lines are being operated at a slight loss when operating expenses, interest, depreciation and taxes are considered. However, the loss is not looked upon as a serious matter for the reason that the bus service has been installed instead of extending railway lines to take care of the growing traffic demands of districts not otherwise served.

The San Francisco-Oakland Terminal Railways operates four buses as feeders to street railway lines. The company considers the operation unsatisfactory so far as the earnings are concerned, the service having been established merely to develop outlying territory. For this purpose it costs less per bus-mile than similar service by the railway would cost per car-mile.

The San Diego Electric Railway, San Diego, Cal., is at present operating three coaches as feeder service in new suburban territory. The company says that motor coach operation has been unsatisfactory so far as earnings are concerned. It is considered desirable as supplementary or feeder service in order to avoid making large investments in sparsely settled territories, or to replace the street car service in unprofitable territories. "Supplying service demanded at less cost" is believed by this company to be the real truth concerning the motor coach operation by electric railways. The coach is considered "not suitable for mass transportation from the standpoint of safety, comfort, cost of operation, reliability nor ability to handle rush-hour crowds."

The Municipal Railway of San Francisco first commenced the operation of buses with rented equipment in 1917, its own equipment not being in use until February, 1918. Bus service has been only fairly satisfactory, but has obviated the necessity of having to build expensive lines in order to take care of sparsely settled communities within the city limits. At present with eight buses the loss on their operation is approximately \$100 a day. The actual operating cost per mile for buses almost equals that of the street cars. The advantage, however, lies in the fact that there are much smaller interest and depreciation charges to be met.

The Santa Barbara & Suburban Railway operates six buses in city service. This is done to supplement car service, because the investment required renders it

impossible to build car lines into newly developed territory. The fare charged on the bus, which is 8 cents, the same as the railway, is too low for bus operation, in the opinion of the company, and the service is rendered as a protection to the railway investment and to eliminate competition. The railway believes that the bus has some advantages, such as being able to take on and discharge passengers at the curb and to render more speedy service. On account of the tremendous investment required to handle mass transportation, buses can never supplant railway service.

The Kansas Electric Power Company, Emporia, Kan., last summer purchased two buses which were placed in operation in August as a trial installation to determine whether or not such service would be more satisfactory to the public and to the company than the existing street railway operation. The company says: "We have been unable so far to show any advantages in bus operation over street car operation so far as the cost of service is concerned, and there has been very little difference in the amount of revenue obtained. The depreciation on the bus will be about twice that of the street car and the cost of each unit would be approximately the same. There would undoubtedly be some saving due to track and paving maintenance. This would probably be just about offset by the higher bus maintenance and depreciation."

The City Electric Company of Albuquerque, N. M., operates one bus on a route extending outward from the center of the town but not competing with the railway. Experience has been satisfactory so far but the bus is more costly to operate than is a small street car.

The Sioux Falls Traction System, Sioux Falls, S. D., operates five buses in city service. The company says: "We find the bus has an important field to fill in city transportation, serving sections where it is impracticable to make the heavy investment required for the construction of an electric railway line. Actual operating costs per vehicle are higher for the bus than for the street car, but considering all the component parts of the electric railway system, such as track, overhead wiring and paving, the bus has considerable advantage.

"As an element of protection from destructive competition on the part of fly-by-night jitney operators it appeals to us that it is necessary for street railways to co-ordinate the transportation facilities of a community under one management. Because the street railways from their experience in the transportation field are qualified to serve the public, if buses are necessary to furnish properly the required transportation in addition to that furnished by the existing street railway lines, then it is up to the street railway to supply this means transportation if it is to function properly within the community it serves.

"There are certain advantages in the operation of motor buses over street cars, especially on single-track lines. A disabled car, a derailment, or a broken trolley wire sometimes ties up the entire street railway system for the time being. Fire, paving operations, traffic blockades cause similar effects. Delays at passing switches are inevitable and tend to slow up the service. Motor buses have none of these drawbacks, operating as they do each as a separate unit. But their capacity is limited, they are not so commodious and hence passengers load and unload more slowly. When they are full they are so full that they lack the ability of the street car always to take on one additional passenger.

"We feel that the truck manufacturers, the body builders, etc., are doing an injustice to the type of equipment now coming into extensive use when they refer to it as a 'bus.' When one refers to a 'bus' the first impression is of an old, narrow, side-seated rattly affair, such as used to meet all railroad trains. The beautiful, comfortable, modern equipment now being put into service is entitled to a more dignified name and we invariably call ours 'coaches,' and are endeavoring to educate our public to do likewise."

The Eastern Texas Traction Company, Beaumont, Tex., operates one bus as a feeder to its interurban railway line. The bus runs from Nederland, a small town on the interurban, to Port Neches, about 4 miles distant, in which is located a large asphalt plant. The line was instituted to give a much needed service to the people of the communities concerned, and there was no expectation of profit on the investment. On the contrary it was expected to operate at a loss until the district develops further. Operation has not been of long enough duration to permit any definite conclusions.

The Northern Texas Traction Company, Fort Worth, Tex., operates eight buses in city service. The greater part of this operation is an extension to one of the city lines to serve a pleasure resort. For several months buses have been serving a territory to which a street railway line is now being built. The company says: "The experience we have had with bus operation has been satisfactory for the purposes for which we use it. Our bus operation has all been without profit and a considerable loss has been experienced a great part of the time. We feel, however, that a loss of this nature is justified in some cases, in order to keep all transportation under control of the street railway system.

"While our experience with bus operation is somewhat limited, it is our opinion that the bus has no physical advantages over the street car and that the limitations of the bus are far greater than those of the street car in handling mass transportation. We firmly believe that the bus has its field in transportation and that street railways should develop this field."

The San Antonio Public Service Company, San Antonio, Tex., operates ten buses, mostly in shuttle service. They were placed in operation to replace an old street car shuttle which was abandoned to avoid extensive paving charges, to take care of territory not easily accessible to the railway and threatened with jitneys, to give service to territory not served by the railway and furnishing the backbone of the jitney patronage in South San Antonio, to give temporary service while a railway line was being reconstructed, and to replace a suburban trolley line which was very unprofitable and badly in need of reconstruction. These operations were generally successful in that expenses were met and losses reduced, although no large profits have been made.

The Utah Light & Transit Company, Salt Lake City, operates a crosstown bus line connecting with its railway lines. This service was inaugurated in order to forestall jitney operation by an independent company which desired to operate directly into the business center of Salt Lake City in competition with the railway, and has achieved the desired object.

The Street Railway Division of the City of Seattle, Wash., has been operating ten buses as feeders to its railway lines for more than four years. The fare is 10 cents, with three tokens for 25 cents, as on the cars, and free transfers between the two services. The bus operation is said by the department to be very satisfactory.

Back Over the Year with a Skip and a Jump

By G. J. MacMurray

News Editor ELECTRIC RAILWAY JOURNAL

Before the Cinematograph Projects the 1924 Picture of the Electric Railways 'Tis Well to Recall a Few of the High Points of the News of 1923. After It's All Over You Can See a Lot of Humor in It—After It's All Over

THE executioner was about to push the button that would release the current which would send to his death the man in the chair before him. "Is there anything you would like to say?" asked the warden.

"Yes," said the convict, "I should like to give up my seat to the man standing on your right."

The man standing on the right was the executioner. The magnanimity of the convict is very much like that felt by the writer when the task was assigned to him of writing this review. He felt like giving up his editorial seat to his tormentor or to some other member of the staff.

NO OCCASION FOR PESSIMISM

Perhaps you feel somewhat the same way about the electric railway business as President Loree did about the steam railroading when he said: "Railroading has ceased to be a business—it is a calamity." The occasion doesn't exist now for such pessimism. It has passed. You have lived through it. You have Mr. Emmons' word for it. And you have Mr. Welsh's word for it. If I am to be assigned by some pessimist to the Ananias Club, I should at least be permitted to pick my company. If figures mean anything, then there is cheer in the report of the census of the industry showing that the number of passengers increased 12 per cent in the five years from 1917 to 1922. Earlier in the year the association statistics for representative roads showed that the operating ratio was down to 72.6 per cent.

But think of men in other lines. They have their troubles, too. Just at present the cotton mills of New England are shut down because of the rage for King Tut printed cloth. As the head of the mill said: "If ever I hear that they are about to dig up another of those old Egyp-

tians you can be sure I will see to it that they find him wrapped up in the product of a New England ging-ham mill." This was a case for real dejection, but this man didn't go home and eat his wife's Mineralava. Why should you?

King Tut jokes are pretty old now, but this one is particularly pertinent. It illustrates a point Mr. Wickwire made in his speech at the C. E. R. A. meeting that railway men are selling a service, not a product. You don't have to think back to the time of King Tut unless you happen to have the King Tut slant on things. Your styles don't change much, except the turnstile. It seems to me as a slim man that the impression you make on your passengers depends a great deal upon whether you use plush, rattan or slat seat. The car-mile, the car-hour and all the other units have, it appears, received more attention than they deserve. You may, perhaps, consider all this somewhat trivial, but if you are like the man that the publishers told about in their house ad in the JOURNAL for Dec. 1, who in his opening sentence said that the JOURNAL was great stuff—and in addition that he read it—then you have noticed that the Chicago Elevated Railways have gone to the plush seat.

In this connection you will recall that a few years ago a man said that he took a street car for the same reason that he did an ambulance—because he was helpless. On the other hand the steam roads were not much better off in the matter of public opinion. The public is moved to emotion by little things, personal things. You will probably recall that in speaking about the steam railroads Mr. Dooley said: "Whenever I feel the desire to fly through space I throw four dollars out of th' window, put a cinder in to me eye, an' go to bed on a shelf in th' closet."

Of course, the stigma of the re-

mark about the public be damned has passed down through the years, but even that remark was greatly exaggerated as the former president of the Associated Press has made plain. These are all reactions the causes of which are steadily being corrected. Aside from the discussion of the sale of transportation, this has been the big topic during the year. Hardly a company throughout the country but has done something to bring its service more forcefully to the attention of the public. It really is startling the amount of excellent material along this line that is available in the record of the year's activity as published in the JOURNAL on all the various means that have been developed for making the service more attractive. The thesis on which the Coffin award was made, which honor went to an interurban whose president is now the president of the American Electric Railway Association, contains a myriad of suggestions alone on the subjects of public relations and merchandising. As for the copies of the ELECTRIC RAILWAY JOURNAL, they are replete with the records of good public relations work. Of the talks along similar lines one of the best was "Jack-in-the-Pulpit Is Succeeding the Shrinking Violet," made by Labert St. Clair of the American Association.

"MODERNIZE AND MERCHANDISE" THE SLOGAN

Somewhat in line with the talks of the year was the interview headed "Modernize and Merchandise" with Britton I. Budd in the issue for Dec. 22. This interview was unusual in its method of presentation and in its significance. As inspiration for the new year it should be reread and then kept at hand for reference as it offers so many suggestions likely to be found helpful in dealing with the problems of 1924.

As has just been indicated, many

striking things have been done to sell the service to the public, but one of the most spectacular and successful attempts of the kind made during the year was that by Mr. Morgan of Brooklyn in connection with the introduction of the first of his 200 pay-as-you-pass cars. So far as Mr. Morgan and his men are concerned—

Brooklyn now has a brand new treat—
A car that wins on any street.
It's painted red with yellow trim;
The lines are smart—appearance slim.
It's up to date and very bright
And rides with ease—a real delight;
A modern fare box near the center,
No harsh demand, "Pay as you enter."
Seats fifty-three—sounds odd, no doubt,
But Clint knew what he was about.
He showed the car on Borough Hall
loops
And took his patrons through in groups,
And told them of the car so new
And brought its strong points to their
view.
This done he started to run four,
The harbinger of tenscore more.
At selling the service 'twas a very
good stunt,
And that's where Morgan is up near
the front.

Over in Long Island City General Andrews provided sample rides in introducing a new service. And Blinn and Atchley certainly have sold their service to the people of Akron, who are invited to pay 6 cents for their ride—and they are doing it—although the company has been unable to get the city to advance fares to more than 5 cents, regardless of the fact that the ride costs 5.7 cents.

DON'T PRAY FOR TOO MUCH

In connection with the merchandising of transportation Daniel L. Turner, consulting engineer New York Transit Commission, in two articles on foreign practice, pointed out that there is much to be learned from the properties abroad, especially in the methods of merchandising transportation. Still, New York holds the palm for carrying passengers. In somewhat the same category was the article "Merchandising Transportation Abroad," by J. Kappeyne. But publicity is not a panacea. Neither is merchandising. Some railway men expect too much of them. They are inclined to be impatient of results. They are like the Jew referred to in the article by Mr. Sanders in the issue for May 12. This article deserves careful rereading. As Mr. Sanders retold this story the Jew was losing money. Business was rotten. He was told to pray to God and to have faith. Some time later he was asked how things were going. They were not going any better. He had been

praying for \$8,000 profits. When told that he had been asking too much the Jew replied: "Well, how did I know that was too much. Why didn't he make me an offer?"

Too many railway men have, in a sense, been praying for too much and not telling the people what they have to offer. As Bruce Barton said in his speech before the N.E.L.A., in session in New York in June: "Unless there is back of the desire for better public relations a real conviction, a real, genuine feeling that you are in business as a matter of service, not merely as a matter of advertising service—unless there is that, then it is very dangerous, indeed, to attempt to build public relations on any other ground."

You will recall that Mr. Barton on being offered the publicity account of a bank said to the bankers: "Now you go back to your bank and shave off all the side whiskers, that there are in your bank and you take all the high hats and put them in a pile and light a match to them, because I am going to advertise to people that you are human, and it may be a shock to have them come in and find you as you are."

Some of the publicity and advertising men in the railway field have been laboring under difficulties similar to those that beset Mr. Barton. Railway men are no less human as a whole than others, but the outward aspect of some of them is forbidding. In other words, there are still a few high hats left in the railway field that might well be burned. As President Bill Strandborg said at the first annual convention of the Public Utility Advertising Association held in Atlantic City last June, for practically seven years the advertising fraternity in the public utility field has been "nothing more nor less than a bunch of maverick steers roaming the range and milling around trying to horn into the regular herd." And now that they have horned in some of them appear to have been gored by the otherwise docile members of the full-blooded herd.

After the conventions in recent years, at which the bus has been discussed, I have always come away with the thought in my mind about the man who asked his wife what the topic was that had been discussed at the meeting she attended.

"Oh," was the reply, "we discussed the antecedents of that brazen woman with the dyed hair that's just moved in opposite the Joneses, and also one of the poets—Shelley, I think."

But at the convention at Atlantic City in October there was a great deal more of the olive branch spirit in evidence with respect to the bus than has been the case in the past. Really there was. As Mr. Storrs said at Atlantic City: "Today we find careful students of the transportation problem in practical agreement that the two agencies must be co-ordinated." That this is not a theory Mr. Pontius, vice-president and general manager of the Pacific Electric Railway, made plain in his paper. H. W. Alden, president of the Society of Automotive Engineers, and Alfred Reeves, general manager of the National Automobile Chamber of Commerce, were more than conciliatory in the remarks which they made. So far as the interest of the general public in the matter is concerned, Mr. Brown's address by radio, made last August, was surely a "far-flung" contribution to a better understanding of the problem. On the economics of the use of the highway for motor transport the special committee of the Chamber of Commerce of the United States discussed the relations between the motor bus and the trolley car. A report by another committee of this same body, it will be recalled, recommended the simplification of the taxation problem of the electric railways by stating definitely that in lieu of the present tax a gross-net tax should be imposed.

EVERY STORY HAS TWO SIDES

Some there are in the railway field still inclined to point an accusing finger at the user of the bus, but their number is fast diminishing. More than 120 railways are now using the bus in one form of service or another. Harsh things have been said about some of them in the past, but the old story of survival holds good of them just as it did of Pat. On being reminded by a friend that if he did not resent a supposed insult he would be called a coward, Pat replied: "And, sure, I'd rather be called a coward today than to have people say the day after tomorrow: 'How natural he looks.'" In two cases at least it appears that the funeral oration would have been said over electric railways if they hadn't gone over to the bus.

So you see every story has two sides. The experts will not agree with me about this. That's what an expert is for. He finds out what you think or what you are doing and then he disagrees with you or your methods. That makes him an expert. Not that I am biased about experts. Indeed,

no. But in glancing through for a second time a certain report made early in the year in connection with the operation of a municipal railway, the story kept dancing in my head about the sermon preached by the archbishop on the beauties of married life. Two old Irish women coming out of church were heard commenting upon his address.

"'Tis a fine sermon his reverence would be after giving us," said Bridget.

"It is, indeed," replied Maggie, "and I wish I knew as little about the matter as he does."

In connection with the A. E. R. A. activities, the association was particularly fortunate in having Vice-President Coolidge as one of the speakers at the Midyear Meeting in Washington. Little did we or he expect then that he would so soon have to take up the burdens of the President. He said that without the electrical development of the last twenty years it would not be possible at the present time to carry on the business of the nation as it is being carried on, either for the transmission of intelligence or in the transportation of merchandise and of the people. President Emmons said that it was fitting to pause for a few moments to express appreciation to the federal government for its constructive assistance to the electric railway industry. The late President Harding also had a kindly word for the men in the industry. This he communicated to the meeting in a letter through Secretary of the Interior Fall. Former Vice-President Marshall also spoke at the banquet.

FLOWERS COULD BE SENT TO SOME CONGRESSMEN

It is always a treat to listen to Mr. Marshall. It will be recalled that he wanted the flowers used to decorate the tables at the banquet sent to the District committee at that time trying to re-establish the 5-cent fare on the local lines. Judging by recent news events there are a few other Congressmen to whom flowers might fittingly be sent just now. Remember that Mr. Marshall said he spoke as a straphanger, but that this didn't give him the right to tell the men present how to run their business.

As just indicated, Mr. Marshall, in the particular situation that existed in Washington, wanted to say it to the local commissioners with flowers. In New York a public-spirited citizen, disgusted with the apathy of the local officials to the need for new transportation facilities, coined the

phrase: "Say it with shovels." He meant, of course, that the shovels should be applied to the building of new lines, but certain politicians apparently got the idea that the shovels might be used to inter them, so a more conciliatory attitude has been in evidence on their part recently. In New York 160,000 people are being added to the population of the city every year, but no new trunk line subways have been authorized since 1913. If the Transit Commission had its way, however, it would spend \$218,000,000 for seven new lines. In what some consider an excess of zeal Borough President Miller of Manhattan wants to tear down the Sixth Avenue Elevated. The Board of Estimate has approved his plan and something may come of it in spite of the revolutionary character of the suggestion, which would put the cost of a substitute subway on the adjacent property owners.

As for the 5-cent fare in New York it is still a myth. The surface cars charge for transfers, and on the rapid transit lines the passenger pays 5 cents and the city pays 1 cent out of taxes. The 5-cent fare hasn't been saved. It has merely been camouflaged.

Chicago's new Mayor, Mr. Dever, wants municipal ownership and operation of the surface and elevated lines. He says that the 1907 settlement ordinance has failed. On his recommendation, however, the Thompson policies have been thrown overboard and the Council on Oct. 27 voted unanimously to repeal the 1921 ordinance forfeiting the franchise of the Chicago Surface Lines. It also voted to discontinue the forfeiture suits and to accept the city's share of the companies' profits since 1919, aggregating more than \$8,000,000. As for Chicago's unified transit plan, it has been revived by the report of R. F. Kelker, Jr., consulting engineer to the City Council. He wants the surface, subway and bus lines unified. In short, Mr. Kelker's program calls for \$372,823,000 for new work.

Philadelphia also proposes to step ahead. It has been voted there to merge the present transit programs and to carry out so-called Step 1, for which the sum of \$42,000,000 is available. Detroit has also been considering rapid transit. Neither the extent of the system there nor the financial plan has been decided upon, but construction costs have been estimated at \$3,500,000 a mile for an elevated system and \$4,700,000 a mile for subway. The Rapid Transit Commission there recommends a

pay-as-you-go plan that spreads the cost by assessment over the property benefited and the city at large, leaving only the equipment, about 32 per cent of the total investment, to be provided by a bond issue. Los Angeles and Cleveland are other cities that want subways.

Within their own organization the electric railways reduced the subject of safety almost to a science. The great menace now lies in the growing use of the automobile. It is perhaps not too much to say that one of the most complete series of articles on safety pertaining to any one industry published anywhere was contributed by C. W. Price to the JOURNAL. There were ten of these articles—concise chapters in a complete treatise designed to tell an electric railway man definitely how to organize a community for safety. Last year the material on safety was packed largely into one special issue. The matter of writing about safety is a continuous process. The work will never be done. It is too much to expect of human nature that there will not always be a few fools who will become angels at a crossing.

NO LEGISLATION 100 PER CENT PERFECT

Rulings and legislation are all right in their way, but they not infrequently go astray. Take the legislation in both Oakland and Dayton against the one-man car. Laws against the operation of these cars were passed in both cities, but no attempt was made to enforce them. The passage of these and similar measures recalls the case of a U. S. Senator who had just finished a night's work on a speech. "You have convinced me," said his secretary, "except for one trifling detail. Where do I get off?" The Senator touched his nose with his finger and sagely replied: "Well, no legislation is 100 per cent perfect." Certainly the one-man car legislation to which reference has been made is in this same category. In Massachusetts there has been some talk of introducing legislation against the one-man car, but apparently not enough people were interested to warrant going ahead with the referendum measure. As far as the rank and file of the men are concerned the Amalgamated Association realizes the need for the one-man car. The only concern of that body over the matter is that the cars shall be fully equipped with safety devices, a need that railway executives realize. On the matter of the differential on wages, that, according to the Amal-

gamated, should be a matter of individual negotiation. If one delves behind the scenes at Dayton and Oakland, where the one-man car has been under fire, he quickly realizes that political ambition is fired by the peculiar opportunities which these situations have afforded.

As far as municipal operation is concerned the most notable references in the JOURNAL were to the four years of municipal operation in Seattle, the digest of the Detroit report, and the meeting of the League for Municipal Ownership in Toronto. Up to August last Seattle had experienced a little more than four years of municipal ownership, and during that time three Mayors successively occupied the chief executive's chair. Twice rates were raised, only to be lowered and again increased. At times employees have had to wait for their pay. Jitneys have been ruled off the streets. As Mayor Brown said: "I gave the people a 5-cent fare, but if they would rather ride in automobiles than patronize their street cars, I can't help it." At last accounts a net profit was being shown at Seattle, but on a 10-cent cash fare with tickets at three for 25 cents.

DETROIT TAKING NO CHANCES

The Research Bureau at Detroit, a non-partisan body, reported in July, in anticipation of the complete report, that the revenue of the Municipal Railway for eleven and one-half months was in excess of all charges for operation and maintenance, except depreciation and interest and sinking fund requirements. The report for Detroit for the fiscal year ended June 30, 1923, showed a net income of \$938,467, but the recent decision of the arbitration board fixing the terms of the entrance of the private lines to the city over the municipal tracks is expected to cut the profit of more than \$900,000 in half. High traffic density was a major factor contributing to Detroit's success, in which low taxes and interest rates and the assistance of other city departments also helped to make a favorable showing. Detroit is taking no chances. The wage award, announced during the summer, increased the platform cost \$700,000 a year. The decision to increase wages was met promptly by an advance in fares from 5 cents with 1 cent for a transfer to 6 cents, with 1 cent additional for a transfer, but with tickets at nine for 50 cents.

Of the valuation cases one of the most important was the decision of the Pennsylvania Commission with

respect to the Philadelphia Rapid Transit fixing the value of that property at upward of \$200,000,000. In the case of Toronto the arbitration board there awarded the Toronto Railway \$11,180,000. As for abstract discussions of the problem of valuation, it might be well to reread the report of the A. E. R. A. committee on valuation run in this paper Nov. 3.

In all work being done it is necessary to pause at times and take a check on oneself. It was with this in mind that the editors published in the JOURNAL for Jan. 6 last year a list of economy and betterment measures against which operators could check their performances. The idea behind the chart proved so popular that the chart was reprinted in the issue for July 7 with a caption about the desirability of the individual checking off against the chart. It is hoped that this advice has been followed, but if it hasn't it would be well to act on the suggestion now.

One of the most extensive rehabilitation programs to be carried out by a company of moderate size was the one by the San Diego Electric Railway. That company, with its program well along toward conclusion, will spend \$2,000,000 for extensions and improvements.

As proof that the industry has not passed entirely out of the entrepreneur stage, a new interurban railway was opened during the year. This was the Dallas-Terrell line in Texas. It was placed in service on Jan. 14 and is 30 miles long.

The railway in Des Moines, operating on the basis of no unfair competition from the jitney, is coming into its own. The stabilizing fund has been built up to a point where it has just recently been possible to announce a cut in fare from 8 cents to 7 cents. As for Saginaw, combined railway and bus service under one management was established here on Nov. 1 after the railway lines had been shut down for more than two years. During the very first month of the combined operation the lines were operated at a profit. In New Jersey the 5-cent local fare is not working out as satisfactorily as was anticipated by the Board of Public Utility Commissioners, which urged its adoption. But the full complement of bus competition is still in effect, except that the railway has recently taken over most of the buses in Camden. One thing is certain. The railway cannot be put in a satisfactory financial position until this unfair competitive situation is ended.

Consider the million or more maintenance kinks that have been published during the year in the JOURNAL. I read them all and understand only one. This was a description of the very simple means devised by the Brooklyn-Manhattan Transit Corporation to tell its trainmen how to regulate the heat in cars. You will recall that signs numbered 0, 1, 2, 3 and 4 are painted for posting at terminals and elsewhere. It is intended that these numbers shall indicate to trainmen the notch on the heater switch to which the current shall be turned. The sign illustrated in the JOURNAL reads 0. Speaking as a humble Thoid Avenue Brooklynite and without the approval of the editors, I think they must have forgotten to paint any of the other numbers. As I rode home the other day, my mind gamboled along like this:

It's winter now;
That all will agree.
But they don't know it yet
On the B.-M. T.

On April 1 the weekly pass was withdrawn from sale at Youngstown, Ohio. This was done on the recommendation of the Street Railway Commission, the railway there operating under a service-at-cost arrangement. Youngstown was blamed for having a 9-cent cash fare when with the pass in effect the actual revenue per passenger was less than 7 cents. Abuse of the pass is also ascribed as one of the reasons for its withdrawal at Youngstown. But this is about the only town where it has been withdrawn, and it is going into use in more cities right along. Fort Wayne, Terre Haute, San Diego, Santa Barbara, Chicago (on the "L") and other cities appear to be well satisfied with the pass.

NOTHING IS PERFECT, NOT EVEN THIS STORY

If this account has seemed to trail off toward the end, remember the advice of the editor to the contributor of his thrillers to condense somewhat when nearing the finish. In consequence, so the story goes, the writer concluded his next contribution as follows: "The villain took a Scotch whiskey, his hat, his departure, no notice of his pursuers, a revolver out of his hip pocket, and lastly his life." Also please remember that an editor must combine the attributes of St. George and St. Vitus. Also that:

Whoever thinks a faultless piece to see,
Thinks what ne'er was, nor is, nor e'er shall be.

Electric Railway Costs Approaching Stabilized Conditions

Trend Figures Indicate that Period of Rapid Fluctuations of Labor and Material Prices Is About Over—Wholesale Prices of Commodities and Street Railway Operating Materials Costs Recede Slightly During 1923, While Construction Costs and Street Railway Wages Have Small Advance

INDICATIONS are that the country is once more entering a period when conditions will be fairly stable. This is a deduction that may be made by a look back at economic history. There has been a steady though gradual rise in all figures for labor and material costs from the time the country was settled. This gradual progression has been disturbed to a greater or lesser extent by every war. Costs have risen abnormally, sometimes reaching a peak about the end of the war, and sometimes a few years later, afterward falling again so as to bring them back to something like the old conditions, but always on a basis higher than if the war had not occurred.

A similar readjustment has taken place since the last war and still is in progress. Following the peak in 1920, there was a sharp recession. This was checked about the beginning of 1922, and a new rise began. This spent itself very largely during that year, and in 1923 the changes were relatively slight.

That conditions are getting back toward stability is shown by the tabulation and chart reproduced herewith. This is a compilation by Prof. Albert S. Richey showing the five principal index figures for the electric railway industry over a period of ten years. These were published in the Annual Statistical Number of this paper for Jan. 6, 1923, and have been revised and brought up to date. The methods used for obtaining these index figures were fully described in last year's article.

TREND SHOWN BY THE CHART

In the chart and table the various index figures have been adjusted to a standard base, 100 representing average values during the year 1913. That is the last year during which conditions for this country, or for the world, were fairly stable. The fluctuations since then are therefore shown in proportion to a steady condition which had existed for a number of years.

The chart is plotted on a logarithmic scale so that the relative or per cent change in an index number, from any period to any other, is shown directly by the slope of the line regardless of the distance from the base. This would not be true with the ordinary arithmetic scale of ordinates.

Wholesale prices, as shown by the United States Bureau of Labor statistics, have fluctuated over a fairly narrow range during the year. The peak of the post-war inflation occurred in this item in May, 1920, when a figure of 247 was reached. From then there was an extremely rapid fall in prices to January, 1922, when the index figure of 138 appeared. Following that there was a gradual rise until March, 1923, with 159 as the index. Since then there has been a slight fall, with minor fluctuations, the November index being 152, and the tendency downward.

Construction costs, as given by the *Engineering News-Record* index, were maximum in June, 1920, at 273.8, from which they fell to 162 in March, 1922. A sharp rise ensued, followed by a more gradual increase the greater part of 1923, a maximum index of 222.1 being reached last July. Since then there has been a slight recession, a figure of 217.3 being reached in December.

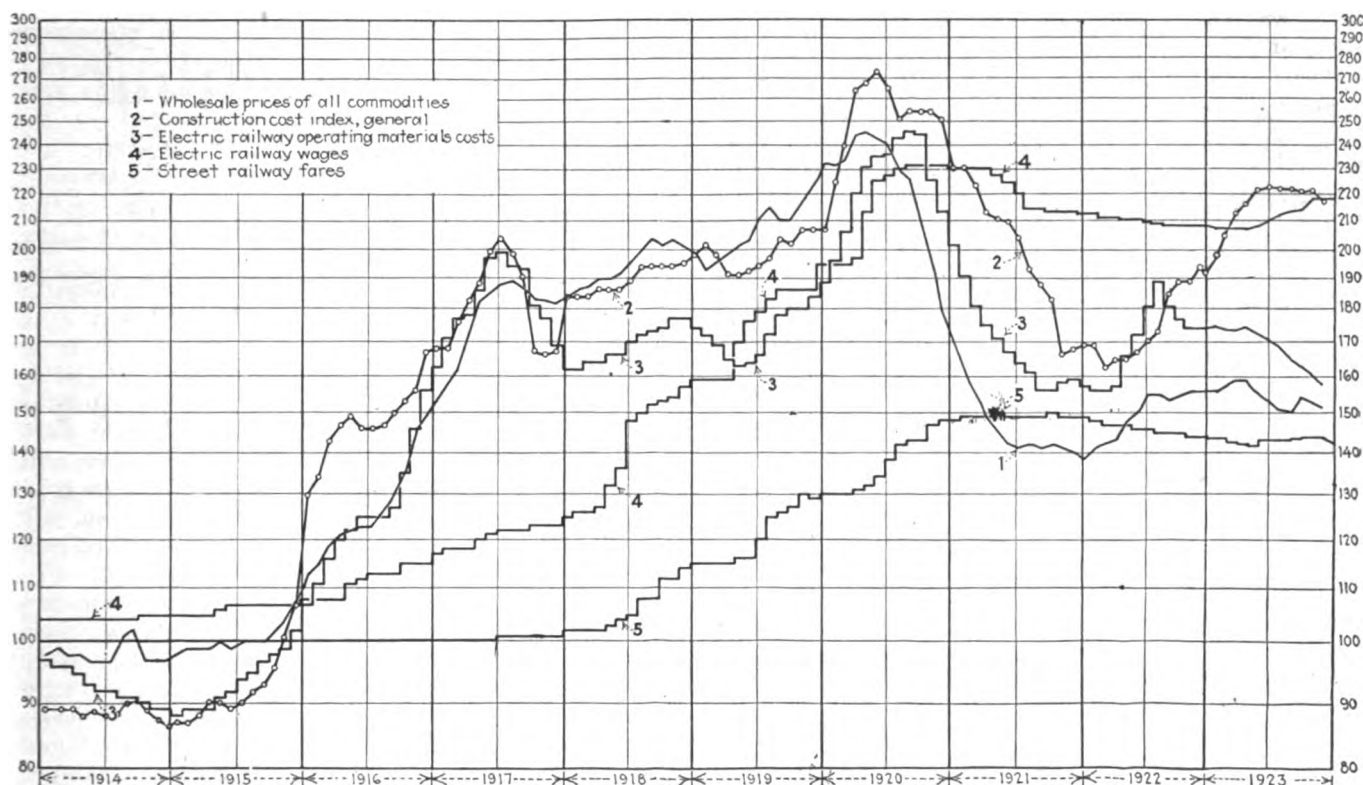
Street railway operating materials have followed a course nearly identical with that of construction costs, although the range of fluctuations has been somewhat less. The peak reached was 247 in September, 1920, and from that point there was a recession to 156, which occurred for several months in the latter part of 1921 and the early part of 1922. A sharp rise followed to 189 in August, 1922, since when there has been a gradual fall. Although there have been slight increases in 1923 for a few months, the figures are at the present time almost back to the lowest since the war, the November index being 158.

The trend of wages in the industry has been somewhat less reassuring. On account of the methods of collective bargaining almost universally prevailing on electric railway properties, there is a slight lag behind the commodity prices. The maximum was reached in September, 1920, with an index of 232, which continued for the remainder of the year. From that time it dropped very slowly during 1921 and 1922, the recent minimum of 207 being reached in January of last year and continuing for four months. The December index of 218 is the highest since July, 1921.

The last index of the series, that of street railway fares, does not follow the same trend as the others. While prices and wages were advancing, fares remained practically the same as in 1913. This continued until the middle of 1918, nearly five years later. A gradual rise ensued, reaching a maximum of 149.6 in the middle of 1921. A slight recession has taken place since then, a minimum of 142.1 occurring last May. Minor fluctuations ensuing have brought the latest index up to 142.4. Fares thus appear to be practically stationary at this level. Such increases as occur are about offset by other reductions.

FUTURE COURSE OF INDEX NUMBERS

The fluctuations of the past ten years do not give a good basis on which to predict future costs, but going back again to the earlier economic history, one is able to find a precedent for what may be the trend of the next few years. The nearest approach to present conditions is the period immediately following the Civil War. Then there was a rise all through the war, with a peak about the time of the cessation of hostilities. Following this there was a sharp drop which began a series of quite rapid fluctuations, whose general trend



Trend of Prices, Wages and Fares, Based on Figures Assembled and Compiled by Albert S. Richey

	Wholesale Prices, All Commodities (U. S. Bur. Lab. Stat.)	Construction Costs (Eng. News-Rec.)	Eleo. Ry. Operating Materials Costs (Richey)	Eleo. Railway Wages (Richey)	Street Railway Fares (Richey)		Wholesale Prices, All Commodities (U. S. Bur. Lab. Stat.)	Construction Costs (Eng. News-Rec.)	Eleo. Ry. Operating Materials Costs (Richey)	Eleo. Railway Wages (Richey)	Street Railway Fares (Richey)
1914						1919					
January.....	98	89.2	97	104	100	January.....	199	198.1	174	159	115.0
February.....	99	89.2	96	104	100	February.....	193	201.5	172	159	115.0
March.....	98	89.0	96	104	100	March.....	196	198.1	169	159	115.1
April.....	98	88.0	95	104	100	April.....	199	191.3	165	159	114.6
May.....	97	88.6	93	104	100	May.....	202	191.3	163	170	115.6
June.....	97	87.9	92	104	100	June.....	203	191.9	164	176	116.5
July.....	97	88.1	92	104	100	July.....	212	193.7	166	179	119.6
August.....	101	90.1	91	104	100	August.....	216	196.7	172	183	125.1
September.....	102	90.4	91	104	100.1	September.....	210	202.9	178	186	126.2
October.....	97	88.5	90	105	100.1	October.....	211	202.3	180	186	126.9
November.....	97	87.3	89	105	100.1	November.....	217	206.9	180	186	129.9
December.....	97	86.5	89	105	100.1	December.....	223	206.9	184	186	129.0
1915						1920					
January.....	98	87.1	88	105	100.1	January.....	233	206.6	189	195	129.9
February.....	99	87.4	89	105	100.1	February.....	232	225.1	196	195	129.9
March.....	99	87.7	89	105	100.1	March.....	234	240.9	207	195	130.2
April.....	99	90.2	89	105	100.1	April.....	245	265.2	221	197	131.1
May.....	100	90.2	91	106	100.1	May.....	247	268.9	232	213	131.9
June.....	99	89.0	92	107	100.1	June.....	243	273.8	236	225	134.0
July.....	100	90.5	94	107	100.1	July.....	241	265.7	237	228	138.0
August.....	100	91.8	95	107	100.1	August.....	231	252.0	243	231	141.5
September.....	100	93.0	97	107	100.1	September.....	226	255.2	247	232	142.6
October.....	102	96.2	98	107	100.1	October.....	211	255.2	245	232	143.3
November.....	104	101.1	99	107	100.1	November.....	196	255.3	227	232	147.0
December.....	108	107.1	102	107	100.1	December.....	179	251.6	213	232	147.5
1916						1921					
January.....	113	130.5	107	108	100.1	January.....	170	230.9	202	231	148.2
February.....	115	134.5	111	108	100.1	February.....	160	230.7	191	231	148.6
March.....	119	143.0	116	108	100.1	March.....	155	224.3	181	231	148.9
April.....	121	147.3	120	108	100.1	April.....	148	213.1	175	231	149.1
May.....	122	148.9	122	111	100.1	May.....	145	210.8	171	228	149.6
June.....	123	146.5	125	112	100.1	June.....	142	209.8	167	225	148.9
July.....	123	145.8	125	113	100.1	July.....	141	203.8	164	221	149.0
August.....	126	146.6	125	113	100.1	August.....	142	193.1	161	215	148.7
September.....	130	149.6	127	113	100.1	September.....	141	188.3	156	215	148.9
October.....	136	152.9	135	115	100.1	October.....	142	182.6	156	214	149.6
November.....	146	155.7	146	115	100.1	November.....	141	166.3	158	214	148.9
December.....	149	167.2	156	115	100.1	December.....	140	167.8	159	214	148.6
1917						1922					
January.....	153	167.8	163	117	100.1	January.....	138	168.7	157	213	148.6
February.....	157	167.8	171	118	100.1	February.....	141	168.7	156	213	147.8
March.....	162	175.7	177	118	100.1	March.....	142	162.0	156	212	147.4
April.....	173	183.4	178	118	100.2	April.....	143	164.7	157	212	147.4
May.....	183	187.6	186	120	100.2	May.....	148	164.6	166	211	147.4
June.....	185	199.3	197	121	100.2	June.....	150	166.6	172	211	145.5
July.....	188	204.1	199	122	100.6	July.....	155	169.7	181	210	145.5
August.....	189	198.4	194	122	100.6	August.....	155	173.4	189	208	144.9
September.....	187	190.3	193	122	100.6	September.....	153	185.0	181	208	144.8
October.....	183	167.1	181	123	101.1	October.....	154	188.6	177	208	144.6
November.....	183	166.5	175	123	101.1	November.....	156	188.6	174	208	144.1
December.....	182	167.1	169	123	101.2	December.....	156	192.6	174	208	143.7
1918						1923					
January.....	184	184.5	162	125	101.7	January.....	156	191.7	175	207	143.4
February.....	186	184.5	162	126	101.7	February.....	157	197.4	174	207	143.4
March.....	187	184.5	164	126	101.9	March.....	159	205.3	174	207	142.4
April.....	190	186.0	164	127	102.2	April.....	159	213.5	175	207	142.3
May.....	190	186.0	166	132	102.8	May.....	156	216.7	173	208	142.1
June.....	191	186.3	166	136	104.5	June.....	153	220.7	171	210	142.9
July.....	196	188.7	170	148	105.1	July.....	151	222.1	169	212	142.9
August.....	200	193.9	172	150	107.5	August.....	150	221.5	165	214	142.9
September.....	204	193.9	173	152	108.2	September.....	154	221.5	163	215	143.4
October.....	202	193.9	174	153	112.0	October.....	153	220.3	161	218	143.5
November.....	203	193.6	177	154	112.3	November.....	152	220.9	158	218	143.5
December.....	202	194.8	177	157	114.4	December.....	...	217.3	...	218	142.4

was downward. The limits of these fluctuations grew less and less, until in 1873 a panic minimum was reached. Following this there was a gradual increase in prices, which continued with minor fluctuations until 1913. Somewhat similar reactions have taken place after all wars, not only in the United States but abroad.

The present trend figures follow a similar course. Due to conditions which were quite different from those existing at the close of the Civil War, the peak was not reached for nearly two years later. Since then the downward trend, with the reversing fluctuations, has been quite like the cost variations following the earlier war.

A similar series of fluctuations may be expected to continue. However, steady prices should follow more rapidly the last war than the Civil War. More intensive industrial methods, quicker means of communication, faster transportation, and shorter time required for turnover of stocks, all point to stabilization of the important commodities in a much shorter period than after the earlier upheaval. Hence, it seems probable that by the close of this year the industry will be in a position where estimates can be made with assurance that they can be met with little more than the usual allowances for contingencies.

It would seem likely that there will be a slight recession in materials prices, lasting probably the greater part of 1924, or even into next year. Wages and fares, being slower to follow the general trend, may not show similar changes, and in any event the fluctuations from the 1923 values are not likely to be so great as those of materials prices.

The Year in Heavy Traction

Outstanding Events Are Decisions to Electrify Virginian Railway and Toledo & Ironton—Other Projects Under Consideration—Numerous Electrifications Under Way in Foreign Countries

IN THE heavy traction field the year just past has been relatively quiet in the United States. Many projects are known to be under consideration, but definite announcements have been withheld except for a few. It is certain, however, that improved credit conditions of the railroads would impel them to start important projects in a number of localities. This is likely to come if Congress does not enact radical legislation hampering the railroads.

The outstanding event of the year was the announcement that the Virginian Railway had contracted to electrify 213 miles of track between Roanoke, Va., and Mullens, W. Va. This road, while one of the newest of American railroads, has been noted for its rapid development of traffic and the increase in tonnage of trainloads handled. It is now moving 7,000,000 tons of coal annually, but this could be increased if the road had greater capacity. While it is using some of the most powerful Mallet steam locomotives in the world and is handling trainloads of 5,500 tons, this is not considered sufficient, and electric locomotives developing 20,000 hp., as compared with 7,000 hp. of the Mallets, will be substituted to haul 9,000-ton trains up the grades. Furthermore, these electric locomotives will have a working speed at these loads of 14 m.p.h., against 7 m.p.h. for steam. It will also be practicable to increase the trainloads to 12,000 tons if necessary.

The selection of the single-phase 11,000-volt system

for this road is perhaps natural, since the Norfolk & Western, which is directly across the river, has been using this type of power supply for some ten years with success in similar service. Although competitors, the similarity of the traffic handled and of the system and equipment will make it possible to use the trackage jointly if necessary, or even to interchange motive power. This will be a material factor in assuring reliability of service, should occasion arise.

Another event of more than passing importance in the heavy traction field was the decision of Henry Ford to electrify the Toledo & Ironton Railroad. At present this is a smaller project, but it is more than likely to be the first step in the complete electrification of the entire 500 miles of the Detroit, Toledo & Ironton Railroad. It is planned to haul heavy trainloads on this road. Although complete details of the installation have not been given out, the system, like the Virginian, will be single phase, though the contact line potential will be 22,000 volts instead of 11,000. It was felt that this will permit of greater concentration of power with comparatively small currents to collect, and low line losses.

In the last days of the year a statement was given out by the Baltimore & Ohio Railroad that it will proceed to electrify its lines in the Borough of Richmond, New York City, which comprises Staten Island. These lines, which are entirely separated from the remainder of the railway's system, are used as a freight terminal by the company. Certain of them form what formerly was the Staten Island Rapid Transit Company, giving a local passenger service to the greater portion of the island. Since there is a strong probability that these lines ultimately will be connected with the rapid transit systems of New York City by means of a tunnel under the Narrows, it is quite likely that there will then be through routing of trains. For this reason the company intends to make its system interchangeable with that of the New York subway and elevated roads, which is 600 volts with third-rail contact line.

In addition to these major projects, work has gone ahead on other roads. The Illinois Central electrification of its Chicago terminal, which was announced in 1922, has gone forward. This system will comprise some 418 miles of track, on which the suburban service only will be operated with multiple-unit trains on 1,500 volts d.c. equipment. The Norfolk & Western Railroad has added to its motive power four electric locomotives of a type similar to those of the original order. The New York, New Haven & Hartford Railroad placed in service during the year twelve additional 180-ton locomotives of the a.c.-d.c. type, which are practically identical with the five placed in service in 1919.

During the year a successful demonstration was made of a new type of overhead construction with a double contact line suitable for the heaviest loads and speeds now in use on any railroad.

In the foreign field more apparent progress has been made than in the United States. The Mexican Railway electrification is progressing and, barring difficulties due to the recent rebellion, should be in operation before the close of 1924. The Chilean State Railways began electric operations during the year. This is an important electrification, comprising 144 route-miles and using thirty-nine electric locomotives. The Paulista Railway in Brazil has started operation on a considerable portion of its system and has placed orders for 35 additional miles, bringing the total up to 63 miles, between Jundiahy and Tatú.

In Europe developments are also going forward steadily. An ambitious program of extensions of the suburban line electrifications in the suburbs of London is progressing with considerable rapidity. These are being equipped with the 600-volt third-rail system, except for a portion of the London, Brighton & South Coast line, of the Southern Railway, which uses single phase.

The French railroads are making an elaborate series of competitive trials of locomotives constructed by various American and European builders. The roads being

electrified are the Paris-Lyons-Mediterranean, the Midi and the Paris-Orleans, all using 1,500 volts d.c.

The Spanish Northern Railway has begun operations with the 3,000-volt d.c. system during the year. A portion of the locomotives were built in this country and the remainder in Europe. The Moroccan Railways will electrify 75 miles, while the Java State Railways is electrifying lines on the island of Java. The Japanese Government Railways also has obtained additional locomotives. All this equipment is being built in America.

Outlook for Railway Financing Better

Investment Bankers Not Yet Enthusiastic, but Are Cognizant of General Improvement—They Urge Railways to Keep Their Case Before the Public—Equipment Trusts Take Well, but Wide Choice Had by Investor in Present Market Militates Against Railway Issues at Low Costs

BANKERS react both favorably and unfavorably on the outlook for financing electric railway securities during the coming year. On the whole, however, their general attitude toward the electric railways appears to be distinctly more favorable than it has been in the past. Time heals many wounds. The electric railways were deeply wounded as regards their credit. In consequence the recovery is correspondingly slow. The reasons are not far to seek for the almost complete destruction of the credit of the electric railways. It would be trite to repeat any of them were it not for the fact that such repetition carries with it a suggestion of corrective measures.

Representatives of banking houses of original issue who were interviewed on the subject of electric railway financing do know that the railway situation as a whole is much better than it has been, but they have very little interest in the situation as such. They are not interested because, as one banker said, no statement of the industry as a whole can be applied to a particular property. The concern of the banker is with the individual property which is seeking the loan. It may seem elementary to say this, but it is perhaps just as well to remind the industry of this fact. Another thing, there appears to be no general set of requirements which it can be said must be met before bankers are willing to consider a proposition for new financing. The previous earnings record of a road, the condition of its physical property, the type of management, the local political situation, the public relations situation, the labor question, etc., are all matters that are carefully weighed in the balance by the banker, but the stress that is laid on these considerations is not equal. Thus the representative of one house put the considerations that would weigh with him in this order: (1) Satisfactory record of earnings, (2) favorable franchise situation, (3) record of good management. This, by the way, represents the opinion of the head of a house that has perhaps done more purely street railway financing in the last few years than any other.

Somewhat in contrast with this was the opinion expressed by the representative of another house. With him, too, the record of earnings was a primary consideration, but next to this he put the ability of the management to maintain friendly public relations and good relations with its employees. A management

might be better than another so far as its conduct of the physical operations of the property is concerned, but if a trace showed of inability to maintain public relations on a favorable basis, then that outweighs a good record of operating efficiency. In a situation of this kind the thought is that the future is uncertain.

Still another banking representative said that in addition to satisfactory elementary factors such as a consistent record of earnings, a reputation of good management, a favorable labor situation, a satisfactory state of public relations, he would require that the road be protected by a state law which would prevent competition in the business through buses, trucks and jitneys. He would also require an agreed valuation of the property based on a ten-year average of prices for the period, say, 1913 to 1923, in order to establish what seems to be a fair valuation on which a federal court would allow, after depreciation, a return adequate to attract the money required to run the business. All this is presaged, of course, on there being a state public service commission with power broad enough to afford it a real measure of authority. No particular road was mentioned, but the names of a number occur at once that fill this bill of particulars.

MORE EDUCATIONAL WORK NEEDED

The banker wants to see the electric railway business put in sound position as quickly as possible. Several of those interviewed expressed the view that the men in the industry should lose no opportunity to broaden the viewpoint of public officials. Of even greater importance is the need to broaden the knowledge which the public itself has of the situation. To this end it has been recommended that the heads of the railways take the situation into their own hands and come out into the open as often as possible. Another banker said that the only way to get the electric railway story across is to continue, even to a greater extent than heretofore, the excellent work which the American Electric Railway Association, the *ELECTRIC RAILWAY JOURNAL* and others are doing along educational lines. This second statement, perhaps unconsciously, embraces the thought of the other man. In other words, it is education, more education and still more education of the public that is needed. Men in the industry seeking to state their case to the public have been rebuffed in

FIVE-YEAR RECORD OF NEW ELECTRIC RAILWAY FINANCING INVOLVING BOND OR NOTE ISSUES OF MORE THAN \$500,000

	City Railway	Interurban	City and Suburban
1919.....	\$22,800,000	\$6,050,000	\$7,550,000
1920.....	2,250,000	2,340,000	4,200,000
1921.....	11,740,000	1,900,000	7,250,000
1922.....	865,000	750,000	27,138,000
1923*.....	14,562,000†		6,305,000

* Eleven and one-half months. † Does not include \$1,115,000 of Electric Railway Equipment Securities Corporation 6 per cent equipment trust gold certificates.

DETAILS OF NEW BOND AND NOTE FINANCING IN AMOUNTS OF MORE THAN \$500,000 DURING 1923

JANUARY				
Issue	Sale Price	Maturity	Yield	Amount
Philadelphia Rapid Transit 5½ per cent equipment trusts.....		serially 1924—33	5.20 to 5.50	\$4,750,000
Wilmington & Chester collateral trust 6s.....	92½	1933	7.06	2,305,000
MARCH				
Chicago, North Shore & Milwaukee secured sinking fund 6½ gold notes.....	par	1926	6.50	1,000,000
APRIL				
Interborough Rapid Transit 6 per cent equipment trusts.....	par	serially 1924—28	6.00	1,400,000
JUNE				
Boston Elevated 6 per cent gold bonds.....	98	1933	6.25	3,000,000
SEPTEMBER				
United Railways, St. Louis, three-year 6 per cent certificates of indebtedness.....	99	1926	6.38	4,200,000
DECEMBER				
Philadelphia Rapid Transit two-year 6 per cent secured gold notes.....	99½	1925	6.40	3,500,000
San Diego Electric Railway 6 per cent equipment trust certificates.....	96 to par	serially 1925—34	6.00 to 6.50	712,000
Total.....				\$20,867,000

the past. They will be rebuffed in the future. But the thought was expressed that if they keep everlastingly at it they will finally secure a measure of recognition somewhat in keeping with the extent of their effort.

In this connection attention was directed to the annual report of the committee on public service securities of the Investment Bankers' Association of America, submitted on Oct. 29, which said: "The problem of the electric street railways today are those largely incidental to more economical operation and the prevention of unfair competition." As the committee saw it, much progress had been made in the solution of both problems.

So much for the effort that the railway man must make. As for the actual prospects for financing, the fact confronts the railways that the return on the dollar invested in the electric railway business is not so good as in other kinds of business. This is generally well known, but it is important to repeat it because it conveys the idea of the lag that must exist between the terms for securities of the railways and other investments entering into competition for funds under present market conditions. Is the extent of choice with respect to the securities offered the investor often fully realized outside of banking circles? It seems doubtful. The measure of that choice is strikingly indicated, however, by the compilation made available to the JOURNAL by one of the bankers interviewed. In the three years previous to the war the following amounts at par of new issues of securities were offered in the United States:

1911.....	2,411,213,565
1912.....	2,286,480,292
1913.....	2,604,987,654

In New York alone there were offered for the three years since the war the following amounts, at par value:

1920.....	\$4,010,048,184
1921.....	4,234,013,085
1922.....	5,926,854,134

The figures are not yet available for 1923, but in the first eight months of the year recently ended \$3,392,225,795, par value, of securities were offered, or at a rate that indicates a total of more than \$4,500,000,000 for the year.

It is obvious, then, as several bankers said, that in view of the wide range of good investments now available and the large demand for money, the electric railways will have to offer securities at a higher than average yield in order to attract money. The increases in fares that have been secured have made it possible to bring back the physical condition of many of the properties to a high standard. With this done, the surplus in the next few years may be available for additions to rolling stock to keep up with traffic demands, or for other additions to plant.

In this connection there were some very optimistic expressions of opinion. Several bankers thought that the financing of rolling stock might be expected to increase materially in the future. There are a number of companies that could successfully go out into the open market for rolling stock by issues of equipment trust certificates. Some financing of this kind was done the last year, but it was not large in bulk. The principal offerings are listed in an accompanying tabulation, except for the issue of \$344,000 of the Memphis Street Railway.

These issues, inquiry revealed, were favorably received and are well regarded by both bankers and investors. In commenting on them one banker made the suggestion that the electric railways arrange to offer equipment trust certificates for sale in the communities in which the rolling stock will be used. So far this has apparently not been done. This is, indeed, an unselfish proposal, for the banker would be deprived of possible business if this course were followed. The suggestion emphasizes again, however, the thought previously expressed that after all the banker wants to see the business put in a sound position as quickly as possible.

In the discussion on the outlook for the sale of equipment trust certificates, one banker lamented the lack of standardization in electric railway rolling stock. He thought that the negotiation of loans of this kind would be greatly expedited if the situation approximated more nearly the condition that exists in the steam railroad field. Steam equipment is interchangeable, and it is largely this factor that has made the steam railroad equipment trust popular with investors. It accounts for the fact that bonds secured by car trust certificates sell at a very low yield. According to this man too many personal idiosyncrasies are permitted to creep into the design of electric railway cars. As a result such cars are not as a rule interchangeable with other systems. He realizes, of course, that the problem of car design with the electric railways presents problems for solution that do not exist in the steam railroad field. But despite this he thought the industry could with great profit turn its attention to a more thoughtful consideration of the desirability of trying to evolve standard designs.

That there is a real opportunity in the purchase of new cars was indicated by Britton I. Budd in his recent

interview in the JOURNAL. He said that he knew of some interurbans that could well afford to replace the great battleships of cars they are operating. He cited a case where equipment of that kind could be replaced with modern equipment and the entire cost of the new equipment saved in operating expenses in five years. Many similar opportunities are known to exist.

Incidentally, in another discussion the possibility was referred to of the railways making loans on a particular improvement, especially where such improvement involved the development of real estate. Thus a new car-house or shop or terminal might be financed by a distinct loan if the buildings were located where there was a real chance of appreciation in land value.

As for the outlook for financing of the interurbans, here again there was wide divergence of opinion. Practically all who were induced to express their thoughts gave vent to the feeling that the development of freight and express business was one thing the interurbans as a whole could carry on much more intensively. In this connection there was a great deal of praise for the accomplishments on the Chicago, North Shore & Milwaukee Railroad. In fact, it was somewhat surprising to find how extensive was the knowledge which bankers everywhere had of these accomplishments on the Chicago-Milwaukee line. None sought to detract in any measure from the success of this road, but several of those interviewed expressed the thought that there were perhaps certain factors in this particular operation which helped greatly toward the success that has been achieved. Agreement was general, however, that many of the methods that have turned that road into a successful property might well be adopted elsewhere. The personality of the management counted a great deal in this particular case. That was agreed, but it is by no means the secret of the success there attained. It was rather the intelligent application of effort to the problem of merchandising.

The representatives of a banking house which recommends an interurban issue of long maturity selling at a premium and yielding more than 7 per cent said that the motor bus and the motor truck are not a real menace to the interurban. As this man saw it, the fact is being generally borne in upon the people that they are really paying dearly, if indirectly, for the use of the roads by the trucks and the buses, and that gradually the situation will come to equalize itself. So far as the particular road about which he was talking was concerned, he could see nothing ahead that should militate against its continued progress as a dividend earner.

After all, bankers do not sell securities for the moment. They have a distinct obligation to their patrons extending sometimes many years into the future, as fixed by the length of the obligation which they recommend. This is another truism that there would seem to be little need to repeat, but the fact was mentioned by the bankers time and again, and the suggestion was even made that the thought be repeated in this article. As one of the officials interviewed expressed it in stressing these points, bankers do not have the power to turn thumbs down on any particular class of security. It is the investing public which does that for them, popular opinion to the contrary notwithstanding.

As is generally well known and as the bankers pointed out the net return on the dollar invested in the electric railway business is not as satisfactory, never has been and perhaps never will be as is the money put into the hydro-electric or the electric light and power business.

PRINCIPAL ELECTRIC RAILWAY MATURITIES IN 1924 BASED ON DOW, JONES & COMPANY'S COMPILATION

JANUARY			
Corporation	Rate	Amount	
Iowa & Illinois Railway 1st.....	5	\$1,063,000	
Eastern Massachusetts Street Railway ref.....	6	300,000	
January total.....		\$1,363,000	
FEBRUARY			
Detroit, Ypsilanti & Ann Arbor Railway 1st cons.....	6	330,000	
Philadelphia Rapid Transit Company equip. trust G.....	5½	237,500	
February total.....		\$567,500	
MARCH			
Boston Elevated Railway deb.....	6	1,500,000	
Interborough Rapid Transit equip. trust.....	6	280,000	
March total.....		\$1,780,000	
APRIL			
New England Investment & Security Co. secured notes.....	5	13,115,000	
Market Street Railway coll. notes.....	6	4,278,000	
Denver City Tramway prior mortgage.....	6	2,000,000	
Denver Tramway Power extension.....	6	788,000	
April total.....		20,181,000	
MAY			
Michigan Railroad 1st.....	6	4,250,000	
North Hudson County Railway imp.....	5	1,291,000	
Hestonville, Mantua & Fairmount Passenger Railway.....	5	1,050,500	
May total.....		\$6,591,500	
JUNE			
Grand Rapids Railway 1st.....	6	\$2,500,000	
June total.....		\$2,500,000	
JULY			
South Side Elevated 1st.....	4½	8,000,000	
Chicago Elevated Railways deb.....	6	7,000,000	
Broadway Surface 1st.....	5	1,500,000	
July total.....		\$16,500,000	
AUGUST			
West End Street Railway deb.....	7	1,581,000	
Philadelphia Rapid Transit equip. trust G.....	5½	237,500	
August total.....		\$1,818,500	
SEPTEMBER			
Market Street Railway cons.....	5	9,560,100	
Minnesota & St. Paul Suburban Railway 1st.....	5	500,000	
Hosac Valley Street Railway ref.....	4	400,000	
September total.....		\$10,460,100	
OCTOBER			
St. Louis Transit imp.....	5	9,790,000	
Millford, Attleboro & Woonsocket Street Railway.....	5	300,000	
October total.....		\$10,090,000	
DECEMBER			
Detroit Railway 1st.....	5	1,200,000	
December total.....		\$1,200,000	
Railway notes and bonds maturing in:			
January.....		\$1,363,000	
February.....		567,500	
March.....		1,780,000	
April.....		20,181,000	
May.....		6,591,500	
June.....		2,500,000	
July.....		16,500,000	
August.....		1,818,500	
September.....		10,460,100	
October.....		10,090,000	
November.....			
December.....		1,200,000	
Grand total.....		\$73,051,600	

The difficulty of breaking down the nickel as the measure of payment for a car ride and the question of the future of the railway raised by the much-heralded advent of the bus have acted to deter investors from putting money into the railway business. But these uncertainties are rapidly disappearing, for experience is showing that the cost of the ride must be paid for and that the bus cannot replace the railways in any important service. When the public generally comes to realize these changes the securities of the electric railways will increase in popular favor.

After all, the electric railways are merely striving for the same objective as the electric light and power industry—service to the public. All the electric railways ask is an adequate return on the honest investment value in the business. And that they have in the

past often been denied. In their case, in other words, service has not always brought its proper reward. But there is absolutely no question that the public relations work and the better attitude of railway managements are bearing fruit, and that the cumulative effect of these will result in the railways being able to do their financing on more advantageous terms.

Statistics Showing Extent of the Industry

Number of Operating Companies, Miles of Track, Number of Cars and Buses Comprised in Electric Railway Field in 1922

AS IN previous years, the ELECTRIC RAILWAY JOURNAL has compiled statistics of the miles of track and quantities of rolling stock of the electric railway companies of the United States to compare with a similar table which was published on page 50 of the JOURNAL for Jan. 6, 1923. This information was obtained from the August, 1923, "Electric Railway Directory" of the McGraw-Hill Company and is indicative of the conditions as they existed about July 1. As with last year's table, the mileage of electrified steam railroads has been included.

This year, as previously, considerable difficulty was experienced in compiling the table, because, with companies owning both electric and steam equipment, the figures as reported did not always indicate definitely the equipment primarily used for electric operation and that for steam operation. In such case where it was believed that the equipment was primarily for steam service, it was omitted from the table. This course was followed, for instance, with the 2,405 trail freight and express cars reported by the Fort Dodge, Des Moines & Southern Railroad, the 319 motor coal cars reported by the East St. Louis & Suburban Railway, and the 495 coal cars reported by the St. Louis & Belleville Electric Railway. As the purpose of the table was primarily to show the number of cars engaged in street and interurban and electrified steam railroad service, the 300 "other cars" reported by the Chicago Tunnel Company were also omitted. At the same time the compilation includes the 1,129 trail freight cars of the Pacific Electric Railway and the 910 freight cars of the Illinois Traction System, as these roads are primarily electric railway systems that cover a large territory. The method described is the same as that followed last year.

Estimates had to be made in some cases, particularly where lessor and lessee companies were concerned, in regard to track and to some extent in regard to rolling stock, so as to avoid duplication, where the figures as reported in the directory were not very clear in this regard. For this reason, too great reliance should not be placed upon slight differences in this table and in the corresponding table published last year as indicating corresponding differences in the exact status of the industry. The compilation is claimed to be approximate only, but it is believed to be as close to the facts as can reasonably be obtained under private direction, as distinguished from government direction. In a number of cases where a smaller number of cars was reported, the cause is believed to be that with the purchase of new cars, a large number of old and obsolete cars was scrapped. As the scrapped cars had prac-

STATISTICS OF CARS AND TRACK OPERATED BY ELECTRIC RAILWAYS IN THE UNITED STATES IN JULY, 1923

New England States	No. of Cos. Operating	Miles of Single Track	Passenger Motor Cars	Cars, Trail	Electric Locomotives	Freight Motor	Cars, Trail	Service Cars	Other Cars	All Cars
Connecticut	9	1,600.89	1,639	66	108	65	9	323	1	2,211
Maine	14	527.87	426	10	5	33	92	94	34	694
Mass.	28	2,710.33	5,223	280	13	63	8	896	74	6,557
N. Hamp.	11	243.33	307	2	2	4	2	43	10	368
Rhode Isl.	4	400.12	1,259	26	3	31	33	168	1	1,520
Vermont	7	98.50	108	4	7	10	3	13	1	146
1923 total	73	5,581.44	8,962	386	138	206	147	1,537	120	11,496
1922 total	74	5,691.12	8,901	402	137	216	156	1,473	147	11,432
Eastern States										
Delaware	1	139.73	191	72	3	3	30	106	296	1,266
D. of Col.	6	379.25	1,028	92	6	5	29	106	54	2,271
Maryland	10	702.34	2,083	61	13	7	41	12	7	3,551
New Jersey	23	1,464.77	3,035	109	2	22	6	370	170	9,593
Pennsylvania	104	4,625.37	7,555	542	9	164	156	997	5	10,377
Virginia	13	447.27	858	64	3	16	32	59	35	591
W. Virginia	15	611.29	442	9	15	25	27	38	35	591
New York	89	5,427.84	16,882	2,143	131	117	94	1,750	487	21,604
1923 total	261	13,797.86	32,074	3,092	179	359	385	3,362	758	40,209
1922 total	263	13,857.60	32,721	3,199	176	336	308	3,303	839	40,882
Central States										
Illinois	61	3,587.32	5,831	879	64	213	1,955	679	58	9,679
Indiana	28	2,429.99	1,808	265	12	58	513	147	134	2,937
Iowa	23	975.23	789	85	41	17	393	140	76	1,541
Kentucky	7	491.82	774	62	15	10	145	8	1,014	4,009
Michigan	23	1,827.50	2,867	300	22	127	189	232	272	1,431
Minnesota	13	781.51	1,252	8	7	46	98	20	3,240	6,388
Missouri	22	1,146.34	2,551	255	6	20	29	337	42	1,525
Ohio	62	3,998.42	4,269	570	38	241	348	483	439	31,764
Wisconsin	16	768.26	1,035	116	8	12	29	306	19	15,844.59
1923 total	255	16,006.39	21,176	2,540	198	749	3,466	2,567	1,068	20,956
1922 total	254	15,844.59	20,956	2,508	179	588	3,672	2,478	1,260	2,508
Southern States										
Alabama	12	361.79	434	130	3	5	81	60	17	730
Arkansas	8	126.32	228	19	1	1	6	17	3	274
Florida	7	200.41	368	11	12	6	25	25	40	422
Georgia	11	497.61	690	49	1	7	12	18	2	817
Louisiana	8	314.75	732	47	6	1	8	2	868	139
Mississippi	7	94.08	108	21	1	4	31	5	554	218
N. Carolina	9	363.94	307	23	18	6	161	31	14	849
S. Carolina	4	148.18	178	21	2	5	2	58	18	2,551.66
Tennessee	10	444.58	694	70	2	5	2	324	96	3,739
1923 total	76	2,551.66	3,739	391	24	43	272	297	105	4,736
1922 total	78	2,516.83	3,560	374	25	55	302	324	96	3,560
Western States										
Arizona	3	43.79	49	82	178	2,276	3	540	116	7,517
California	37	3,363.54	3,842	483	10	19	223	57	6	861
Colorado	12	453.75	400	146	10	19	223	57	6	66
Idaho	3	100.20	33	3	3	25	2	14	246	687
Kansas	13	508.34	376	39	3	22	128	32	11	611
Montana	7	844.50	115	25	90	2	14	73	5	5
Nebraska	5	241.75	596	10	4	4	73	5	16	79
Nevada	1	7.50	5	5	5	5	5	5	5	5
New Mex.	2	10.95	16	16	16	16	16	16	16	16
N. Dakota	4	25.79	48	22	22	22	22	22	22	22
Oklahoma	13	361.99	298	16	8	38	203	22	2	587
Oregon	10	765.31	729	78	22	2	397	184	31	1,443
S. Dakota	2	19.75	27	27	27	27	27	27	27	27
Texas	22	1,037.05	1,364	103	1	25	13	139	1	1,646
Utah	5	504.83	216	45	21	10	244	17	213	766
Washington	14	1,034.89	1,171	46	31	52	659	112	1	2,071
Wyoming	2	22.00	13	13	13	13	13	13	13	13
1923 total	155	9,345.93	9,298	1,014	275	355	4,172	1,208	384	16,706
1922 total	158	9,239.73	9,304	1,141	255	180	3,465	1,183	453	15,981
1923 Total U. S.	821	47,283.28	75,249	7,423	814	1,712	8,442	8,971	2,435	105,046
1922 Total U. S.	827	47,149.87	75,442	7,624	772	1,375	7,903	8,761	2,795	104,672

tically been retired the net result was an increase in serviceable cars, though the statistics showed a smaller total number of cars.

The compilation showed that the electric railway companies of the country own 112 cable cars and seven storage battery cars. Since these were not sufficiently numerous to warrant a separate column, the cable cars (all of which are in the states of Washington or California) have been included under passenger trail cars, and the storage battery cars under motor passenger cars. Steam locomotives, trackless trolleys and inclined plane cars owned by electric railways are not included in the table. A column of buses owned was published last year, but it has been omitted this year, as a table of buses owned by electric railway companies will be found elsewhere in this issue.

Receiverships Lowest in Thirteen Years

**Twelve Companies Failed During 1923—Mileage of Track Involved and Capitalization Lowest on Record—
Total Number Emerging from Receivership or Foreclosure Is Thirty-one, Lifting 1,772
Miles and \$305,265,000 Face Value of Securities Involved—Net Receiverships
Reduced from Eighty-five to Sixty-three Companies**

THE general improvement of conditions in the electric railway industry is reflected by the marked reduction in the number of properties remaining in receivership at the close of the year ending Dec. 31, 1923. The failures during the year were less in number than in any year since 1910 and the track mileage and amount of capital involved is the lowest since this paper began publishing the record, in 1909. Comparing the figures for 1923 in Table I with previous years the marked improvement in the situation is evident.

The improving condition of the industry is perhaps even better shown by the large number of foreclosure sales during the year, preparatory to reorganization. The total number of sales, and the figures involved, show a material increase over several years previous. Practically all the roads involved in such sales are out of receiverships, have been reorganized and are now able to meet their obligations as they come due.

Details of the new receiverships for the year just completed are given in Table III. No city systems of any great importance went into the hands of receivers in 1923. The largest company in point of capital involved that went into receivership during the year was the Washington-Virginia Railway, which operates 40 miles of interurban lines running out from Washington, D. C., into Virginia. In point of track mileage the Morris County Traction Company, operating 69 miles of interurban lines in northern New Jersey, was the largest.

But five companies were so unfortunate as to abandon operation permanently during the year, as compared with nine in 1922. The track involved was 65.04 miles, as compared with 213.02 the year before. It is impossible to make an exact comparison of the securities involved, on account of the impossibility of segregating the railway property in one case and incomplete information in others, but the totals of stock and bonds involved is materially below that for the previous year. The largest railway to cease operations was the Jersey Central Traction Company, which operated 40 miles of interurban lines in the section of New Jersey between Perth Amboy and the seacoast. The road never was a financial success, depending principally on summer business which was lost with the advent of private automobile competition and finally a bus line.

Table V gives a record in detail of the status of each company that was in receivership at the beginning of 1923, or that went into receivership or was foreclosed during the year. The outstanding feature of this table is the large proportion of roads emerging from receiverships during the year, as compared with those added.

In the New England district the Atlantic Shore Railway and its subsidiaries were sold at foreclosure sale, being reorganized as the York Utilities Company. No companies went into receivership in this territory during the year, so that the total of receiverships was

TABLE I—RECORD OF ELECTRIC RAILWAY RECEIVERSHIPS

Year	Number of Companies	Miles of Single Track Involved	Outstanding Securities—Stock	Bonds
1909	22	558.00	\$29,962,200	\$22,325,000
1910	11	696.61	12,629,400	75,490,735
1911	19	518.90	29,533,450	38,973,293
1912	26	373.58	20,410,700	11,133,800
1913	18	342.84	31,006,900	47,272,200
1914	10	362.39	35,562,550	19,050,460
1915	27	1,152.10	40,298,050	39,372,375
1916	15	359.26	14,476,600	10,849,200
1917	21	1,177.32	33,918,725	33,778,400
1918	29	2,017.61	92,130,388	163,257,102
1919	48	3,781.12	321,259,354	312,915,104
1920	19	1,065.31	28,758,455	72,283,575
1921	19	986.42	32,909,525	36,177,800
1922	14	695.43	18,140,150	20,304,400
1923	12	333.63	8,332,100	14,707,066

TABLE II—RECORD OF ELECTRIC RAILWAY FORECLOSURE SALES

Year	Number of Companies	Miles of Track Involved	Outstanding Securities—Stock	Bonds	Receiver's Certificates
1909	21	488.00	\$22,265,700	\$21,174,000	(a)
1910	22	724.36	19,106,613	26,374,075	(a)
1911	25	660.72	91,354,800	115,092,750	(a)
1912	18	267.18	14,197,300	10,685,250	(a)
1913	17	302.28	15,243,700	19,094,500	(a)
1914	11	181.26	26,239,700	44,094,241	(a)
1915	19	308.31	30,508,817	16,759,997	(a)
1916	19	430.14	13,895,400	22,702,300	(a)
1917	26	745.19	27,281,900	27,313,045	(a)
1918	23	524.22	37,740,325	20,149,384	(a)
1919	29	2,675.48	89,893,400	79,836,738	\$42,300
1920	13	259.90	7,782,400	11,227,328	52,000
1921	13	777.97	33,642,255	30,863,526	5,000
1922	13	322.88	7,491,500	12,640,600	114,683
1923	15	927.45	118,077,959	110,638,250	12,265,000

TABLE III—ELECTRIC RAILWAY RECEIVERSHIPS—1923

	Miles of Single Track Involved	Outstanding Securities—Stock	Bonds	Receiver's Certificates
Denver & Intermountain R.R., Denver, Col.	22.28	1,000,000	500,000	.....
Washington-Virginia Ry., Washington, D. C.	40.00	2,378,300	5,614,000	None
DeKalb-Sycamore & Interurban Traction Co., DeKalb, Ill.	6.50	(a)	(a)	.....
Galesburg & Kewanee Electric Railway Co., Kewanee, Ill.	14.00	310,800	400,000	None
Henderson Traction Co., Henderson, Ky.	8.00	85,000	150,000	None
Owensboro City R.R., Owensboro, Ky.	12.50	75,000	400,000	None
Morris County Traction Co., Morristown, N. J.	68.98	300,000	4,193,066	None
New York & Queens County Ry. Co., New York City	43.65	3,235,000	1,500,000	None
New York & Long Island Traction Co., Hempstead, N. Y.	50.76	1,000,000	1,000,000	None
Dayton, Springfield & Xenia Southern Ry. Co., Dayton, Ohio	27.97	500,000	500,000	.....
The Hooking-Sunday Creek Traction Co., Nelsonville, Ohio	14.99	223,000	*300,000	None
Norwalk & Shelby R.R., Norwalk, Ohio	24.00	125,000	150,000	None
Total for 1923—12 companies.	333.63	8,332,100	14,707,066	.....

* In addition to bonds, interest amounting to \$183,688 is unpaid.
(a) Data not available.

TABLE IV—ABANDONMENTS—ENTIRE—1923

(Includes only companies whose entire traction property has been dismantled or permanently abandoned and not likely to resume operation.)

	Miles	Stock	Bonds
Douglas Traction & Light Co., Douglas, Ariz.	10.00	\$773,180	\$195,000
*Nevada County Traction Co., Grass Valley, Cal.	5.00	(a)	(a)
Fort Scott & Nevada Light, Heat, Water & Power Co., Nevada, Mo.	5.00	(a)	(a)
Jersey Central Traction Co., Keyport, N. J.	39.54	1,131,400	800,000
*Twin State Gas & Electric Co., Brattleboro, Vt.	5.50	(b)	(b)

Total for 1923 (five companies)..... 65.04 \$1,904,580 \$995,000

* Now operating bus line. (a) Data not available. (b) Railway value not given separately.

Table V—Electric Railway Receiverships as of Dec. 31, 1923, and Foreclosure Sales During Year

New England District					
Name of Company	Year of Receivership or Foreclosure	Miles of Single Track Involved	Capital Stock	Outstanding Securities Funded Debt	Receivers' Certificates
CONNECTICUT					
Danbury & Bethel St. Ry., Danbury....	1917	13.00	\$320,000	\$588,500	\$100,000
Hartford & Springfield St. Ry., Warehouse Point.....	1918	48.00	785,000	961,000	None
Shore Line Electric Ry., New London (1).....	1919	28.22	1,000,000	2,725,000	None
MAINE					
Atlantic Shore Ry., Kennebunk (2).....	1915	49.93	1,000,000	1,746,250	None
MASSACHUSETTS					
Concord, Maynard & Hudson St. Ry., Greenfield (2).....	1921	18.15	235,000	230,000	None
Connecticut Valley St. Ry., Greenfield... Northern Massachusetts St. Ry., Greenfield (3).....	1921	47.05	620,000	580,000	10,000
	1921	44.09	500,000	500,000	40,000
NEW HAMPSHIRE					
Portsmouth, Dover & York St. Ry., Portsmouth (2, 4).....	1917	41.46	(4)	707,000	30,000
VERMONT					
Barre & Montpelier Trac. & Pwr. Co., Montpelier.....	1920	9.75	120,000	100,000	None
Springfield El. Ry. (34).....	1918	9.00	100,800	100,000	None
Summary					
Total Jan. 1, 1923.....	11 cos.	360.63	4,880,800	8,308,750	130,000
Net changes and corrections (35).....	1 co.	61.98	200,000	71,000	50,000
Receiverships and foreclosures in 1923..					
Less properties sold or reorganized.....	4 cos.	118.54	1,338,800	2,783,250	30,000
Net receiverships, Dec. 31, 1923.....	6 cos.	199.11	3,345,000	5,454,500	150,000
North of the Ohio and East of the Mississippi					
ILLINOIS					
Alton, Granite & St. Louis Trac. Co., Alton.....	1920	62.00	3,189,000	3,000,000	None
Aurora, Elgin & Chicago R.R., Aurora (6).....	1919	66.00	6,200,000	3,636,000	None
Chicago, Aurora & DeKalb R.R., Aurora (7).....	1916	30.20	950,000	427,500	None
Chicago & Interurban Traction Co., Chicago (6).....	1922	50.00	1,000,000	1,350,000	None
Chicago & Oak Park Elev. R.R., Chicago.....	1911	22.66	100,000	5,992,500	2,210,000
DeKalb-Sycamore & Interurban Trac. Co., DeKalb.....	1923				
Galesburg & Kewanee El. Ry., Kewanee (8).....	1923	14.00	310,800	400,000	None
Peoria Railway Terminal Co. (30).....	1922	11.40	1,000,000	2,444,000	None
INDIANA					
Beech Grove Traction Co.....	1917	3.90	150,000	100,000	None
Ft. Wayne, Van Wert & Lima Traction Co., Ft. Wayne.....	1921	61.63	1,000,000	1,470,000	None
Winona Interurban Ry., Warsaw.....	1916	70.00	750,000	2,343,700	None
MICHIGAN					
Houghton County Trac. Co., Houghton.....	1921	32.15	957,200	660,000	None
Michigan United Rys., Jackson (2, 28).....	1922	257.46	7,000,000	12,355,800	None
Saginaw-Bay City Ry., Saginaw (9).....	1921	64.22	2,600,000	2,063,000	None
NEW JERSEY					
North Jersey Rapid Transit Co., Hobokus.....	1912	18.00	800,000	800,000	None
Morris County Trac. Co., Morristown..	1923	68.98	300,000	4,193,066	None
NEW YORK					
Binghamton Ry.....	1918	50.25	978,995	2,396,707	None
Buffalo & Lackawanna Trac. Co., Buffalo.....	1918	8.80	55,000	1,000,000	50,000
New York & Long Island Traction Co., Hempstead.....	1923	50.76	1,000,000	1,000,000	None
Hornell Traction Co.....	1917	10.90	117,900	150,000	7,000
Brooklyn Rapid Transit Co., New York (29).....	1918	Holding Co.	74,422,959	68,114,700	12,000,000
Brooklyn Heights R.R.....	1919	5.12	200,000	250,000	None
Brooklyn Queens Co. & Suburban R.R. (12).....	1919	65.52	2,000,000	6,624,000	None
Coney Island & Brooklyn R.R.....	1919	46.15	2,983,900	6,232,000	None
Nassau El. R.R.....	1919	136.10	105,925	13,571,928	70,000
New York Consolidated Ry. (10).....	1918	252.88	683,184	22,936,000	None
New York Municipal Ry. Corp. (10).....	1918	85.73		2,207,000	None
Manhattan & Queens Trac. Corp., Long Island City (6).....	1917	21.20	20,000	(11) 2,090,000	None
New York & Queens Co. Ry., Jackson Heights.....	1923	43.65	3,235,000	1,500,000	None
New York Rys.....	1919	91.05	17,495,060	58,773,027	None
Richmond Lt. & R.R., New York (12).....	1920	32.05 (15)	2,871,750	2,200,000	None
Second Avenue R.R., New York.....	1908	30.02	1,862,000	5,720,000	3,140,000
Staten Island Midland Ry., New York.....	1920	28.68	1,000,000	1,000,000	3,000
Steinway Ry., Long Island City.....	1922	31.11	None	1,500,000	None
Ogdensburg St. Ry.....	1922	7.74	150,000	150,000	None
Orange County Trac. Co., Newburgh.....	1923	20.82	325,000	780,000	None
Penn Yan & Lake Shore Ry., Penn Yan.....	1918	8.50	94,000	100,000	2,500
Westchester St. R.R., White Plains....	1920	21.66	700,000	168,000	22,400
OHIO					
Cincinnati & Dayton Traction Co., Hamilton (30).....	1920	91.07 (24)	1,250,000 (24)	4,500,000	
Cincinnati, Lawrenceburg & Aurora El. St. R.R., Cincinnati.....	1913	31.89	808,900	750,000	None
Cleveland, Alliance & Mahoning Valley R.R., Ravenna (2).....	1920	46.00	1,100,000	1,100,000	8,000

reduced from eleven to six. The lines remaining in receivership at the end of the year are all interurbans with small mileage.

The second district, comprising the territory north of the Ohio River and east of the Mississippi, includes a great proportion of the electric railway mileage of the country. In this group the principal change was the completion of the reorganization of the former Brooklyn Rapid Transit properties. The Brooklyn-Manhattan Transit Corporation has taken over the functions of the holding company, and under it have been organized subsidiaries to operate the rapid transit and surface lines. A few of the subsidiaries still remain in receivership. In this reorganization a total of 540 miles of track, with \$77,200,000 in stocks, \$113,450,000 in

NOTES FOR TABLE V

- 1—23.95 miles of track transferred to the Groton & Stonington Traction Co. as of Jan. 1, 1923.
- 2—Sold at foreclosure sale during 1923.
- 3—To be sold at receiver's sale.
- 4—Included in that of Atlantic Shore Railway.
- 5—All service suspended in 1922.
- 6—As included in last year's report. No new information received.
- 7—Sold for junk during 1923.
- 8—Sold at receiver's sale and operation of road discontinued.
- 9—Sold at foreclosure sale and reorganized as Saginaw Transit Co.
- 10—Reorganized as part of New York Rapid Transit Co.
- 11—No bonds issued. Cost of construction carried by temporary notes.
- 12—Receiver discharged during 1923.
- 13—Figures cover portion of securities only.
- 14—Represented as having had right of way but no track built.
- 15—In addition to bonds, interest amounting to \$183,688 is unpaid.
- 16—Successor to Ohio Elec. Ry. Co.
- 17—Sold during 1922.
- 18—Sold and reorganized as Bangor & Portland Transit Co.
- 19—Reorganized as New Jersey Interurban Co.
- 20—Figures for total property. Railway value cannot be separated.
- 21—Notes, bank loans and \$85,050 car trust certificates included.
- 22—Sold at foreclosure sale and operation of railway discontinued.
- 23—Sold at foreclosure sale. Now owned and operated by Scotts Run Ry.
- 24—Information not received from company. Supplied by *Commercial and Financial Chronicle*.
- 25—No par value. Nominal value of stock given.
- 26—Road purchased from bondholders' protective committee and now being reorganized.
- 27—Preferred stock; also 3,000 shares no par value common.
- 28—Sold at foreclosure sale and reorganized as Michigan Elec. Ry. Co.
- 29—Sold at foreclosure sale and reorganized as Brooklyn-Manhattan Transit Corp.
- 30—Omitted from 1922 tabulation.
- 31—Information not received. Supplied by Moody's Analyses.
- 32—Sold at auction and reorganized.
- 33—Sold at receivers' sale and reorganized as Interurban Trac. Co.
- 34—Sold at receivers' sale to Springfield Terminal Railway Co.
- 35—Net changes in individual returns and additions and subtractions for companies included or omitted in error last year.

bonds, and \$12,070,000 of receiver's certificates, have been involved. With the corporate changes ensuing these companies are now on a firm financial basis and should make a far better showing than in the past.

The Richmond Light & Railroad Company, operating lines on Staten Island, also had the receivership terminated during the year. This property involves some 32 miles of track and \$5,000,000 of securities. Material assistance came from the agreement whereby the company was allowed to charge an 8-cent fare, even though within the limits of New York City.

Included in the totals at the beginning of the year were items of \$50,403,634 for stock and \$63,808,000 for bonds of the Interborough Consolidated Corporation. This company was dissolved late in 1922, but owing to technicalities in the approval of the plan the totals were shown in the table at the end of the year. Since the dissolution took place entirely in the earlier year these figures have been removed as a correction, rather than as a termination of the receivership in 1923.

Outside of New York the principal receiverships terminated during the year are those of the Michigan United Railways and the Saginaw-Bay City property. The bonds of the former company were scaled down within the limit of the company's earning power, and the reorganization has put it in a healthy condition. The vicissitudes of the Saginaw property are familiar to all who have followed the course of events in that city. Forced to shut down in 1921 through lack of earning power occasioned by vicious jitney competition, the company remained inactive for two full years until the city took steps to remove the unjust competition and have service restored. A reorganization has been effected, and the road is now getting on its feet.

The Chicago, Aurora & De Kalb Railroad, which for twenty years operated 20 miles of interurban line in northern Illinois, suspended operations on Feb. 1 and was sold for junk, bringing \$90,000.

During the year a master's

Table V—Electric Railway Receiverships as of Dec. 31, 1923, and Foreclosure Sales During Year—(Concluded)

Name of Company	Year of Receivership or Foreclosure	Miles of Single Track Involved	Capital Stock	Outstanding Securities Funded Debt	Receivers' Certificates
Cleveland, Southwestern & Columbus Ry., Cleveland	1922	185.00	6,648,000	4,454,000	185,000
Dayton, Covington & Piqua Trac. Co., West Milton (6)	1922	38.00	1,150,000	550,000	None
Dayton, Springfield & Xenia So. Ry., Dayton	1923	27.97	(24) 500,000	(24) 500,000	.....
Gallipolis & Northern Trac. Co., Gallipolis (17)	1922	5.00	20,000	48,000	None
The Hocking-Sunday Creek Trac. Co., Nelsonville	1923	14.99	223,000	(15) 300,000	None
Lima-Toledo R.R., Lima (16)	1921	82.90	11,000,000	7,254,000	None
Indiana, Columbus & Eastern Trac. Co., Springfield	1921	207.43	4,025,000	7,900,000	200,000
Ohio River El. Ry. & Power Co., Pomeroy (6)	1919	12.70	300,000	315,000	None
Maumee Valley Ry. & Lt. Co., Toledo (17)	1921	23.21	1,000,000	800,000	None
Norwalk & Shelby R.R., Norwalk	1923	24.00	125,000	150,000	None
Toledo & Western R.R., Sylvania (2)	1921	89.00	2,000,000	2,000,000	None
PENNSYLVANIA					
Bangor & Portland Trac. Co., Bangor (18)	1922	8.70	130,000	130,000	None
Buffalo & Lake Erie Trac. Co., Erie	1915	168.00	7,500,000	7,866,000	760,000
Ephrata & Lebanon St. Ry., Lebanon	1921	24.00	189,000	250,000	None
Montgomery Transit Co., Norristown (2)	1923	14.01	(31) 280,000	(31) 160,000	.....
Northampton, Easton & Washington Trac. Co., Easton (19)	1919	17.80	1,250,000	739,000	15,000
North Branch Transit Co., Bloomsburg	1915	30.00	500,000	532,500	75,000
Pittsburgh Railways	1918	595.88	21,726,750	51,541,633	None
Slate Belt Transit Co., Pen Argyl (3)	1922	18.00	360,000	400,000	21,000
Sunbury & Susquehanna Ry., Sunbury (6)	1913	9.20	600,000	640,000	None
Summary					
Total Jan. 1, 1923	53 cos.	3,367.73	245,795,107	377,833,148	18,679,400
Net changes and corrections (55)	8 cos.	118.87	53,161,484	64,437,153	68,500
Receiverships and foreclosures in 1923	10 cos.	285.68	6,298,800	8,983,066	.....
Less properties sold or reorganized	17 cos.	1,116.70	96,949,618	135,556,928	12,085,000
Net receiverships Dec. 31, 1923	44 cos.	2,417.84	102,982,805	196,822,133	6,662,900
South of the Ohio and East of the Mississippi					
ALABAMA					
Birmingham Ry., Lt. & Pwr. Co.	1919	154.08	4,232,800	8,737,872	117,388
Birmingham-Tidewater Ry., Birmingham	1919	32.55	325,000	1,500,000	None
Montgomery Lt. & Trac. Co. (12)	1919	38.00	(20) 2,000,000	(20) 1,430,000	(20) 250,000
DISTRICT OF COLUMBIA					
Washington-Virginia Ry.	1923	40.00	2,378,300	5,614,000	None
FLORIDA					
Jacksonville Traction Co. (6)	1919	64.00	1,500,000	(21) 4,122,050	62,500
Pensacola Electric Co.	1920	24.49	(20) 1,100,000	(20) 1,751,135	None
KENTUCKY					
Henderson Traction Co. (2)	1923	8.00	85,000	150,000	None
Owensboro City R. R.	1923	12.50	75,000	400,000	None
TENNESSEE					
Memphis Street Ry. (12)	1919	129.11	5,000,000	8,730,000	None
WEST VIRGINIA					
Morgantown & Wheeling Ry., Morgantown (25)	1916	27.00	345,000	500,000	214,000
Summary					
Total Jan. 1, 1923	7 cos.	472.43	14,502,800	26,124,547	983,521
Net changes and corrections	3 cos.	60.50	2,538,300	6,164,000	339,633
Receiverships and foreclosures in 1923	4 cos.	202.11	7,430,000	10,810,000	464,000
Less properties sold or reorganized	6 cos.	327.62	9,611,100	22,125,057	179,888
West of the Mississippi					
ARKANSAS					
West Helena Consolidated Co., Helena (33)	1921	5.50	469,975	None	None
CALIFORNIA					
San Francisco-Oakland Terminal Rys., Oakland (2)	1923	262.00	28,175,000	20,704,000	None
COLORADO					
Denver Tramway Co., Denver	1920	226.14	6,156,300	17,458,160	None
The Denver & Intermountain R.R., Denver	1923	22.28	(24) 1,000,000	(24) 500,000	.....
KANSAS					
Manhattan City & Interurban Ry., Manhattan (26)	1922	16.00	612,150	90,000	None
Southwestern Interurban Ry., Winfield (2)	1919	20.00	(27) 100,000	None	None
MINNESOTA					
St. Paul Southern El. Ry., Hastings	1918	17.54	658,225	425,400	None
MISSOURI					
Kansas City, Lawrence & Topeka R.R., Kansas City	1919	12.00	250,000	400,000	None
Kansas City Rys.	1920	314.88	(25) 100,000	30,032,336	None
Missouri Elec. R.R., St. Louis	1919	18.91	1,000,000	700,000	None
United Rys. of St. Louis	1919	460.93	41,296,000	50,690,000	4,200,000

Table V—Electric Railway Receiverships as of Dec. 31, 1923, and Foreclosure Sales During Year—(Concluded)

Name of Company	Year of Receivership or Foreclosure	Miles of Single Track Involved	Capital Stock	Outstanding Securities— Fund d Debt	Receiver's Certificate
TEXAS					
Austin St. Ry.	1921	22.67	810,000	785,000	None
Bryan & College Interurban Ry., Bryan (6, 32)	1920	27.20	300,000	300,000	None
Summary					
Total Jan. 1, 1923	14 cos.	1,349.99	81,439,350	140,348,521	5,480,030
Net changes and corrections (35)	3 cos.	208.22	29,677,100	49,466,625	1,280,000
Receiverships and foreclosures in 1923	2 cos.	287.44	20,657,000	28,675,000	
Less properties sold or reorganized	6 cos.	356.53	21,949,125	29,851,000	
Net receiverships Dec. 31, 1923	7 cos.	1,072.68	50,470,125	100,205,896	4,200,000
Recapitulation					
Total Jan. 1, 1923	85 cos.	5,550.78	346,618,057	552,614,966	25,272,921
Net changes and corrections (35)	6 cos.	382.27	83,038,584	93,328,268	1,501,133
Receiverships and foreclosures in 1923	15 cos.	633.62	29,494,100	43,822,066	
Less properties sold or reorganized	31 cos.	1,793.88	126,664,543	178,501,178	12,578,000
Net receiverships Dec. 31, 1923	63 cos.	4,008.25	166,409,030	324,607,586	11,192,788

sale was held at which the Toledo & Western Railroad was sold to the Doherty interests. The refinancing which has been accomplished will enable the road to

operate and meet its obligations. In the group south of the Ohio and east of the Mississippi River three companies terminated receiverships and two new receiverships began. There also was one foreclosure sale, that of the Henderson (Ky.) Traction Company, which was sold without a receivership. Of the companies in this group where the receiverships were lifted the most important was the Memphis, Tenn., property. After being in receivership for four years the property was turned back to the stockholders without a reorganization and operation continued under the same management as before. West of the Mississippi six receiverships were ter-

Table VI—Abandonments—Partial—1923

(Includes all pieces of track sidings, yards, etc., permanently abandoned—Companies arranged alphabetically by states.)

	Miles			Miles	
	City	Interurban		City	Interurban
Birmingham-Tidewater Ry., Birmingham, Ala.	0.06		Buffalo & Lake Erie Trac. Co., Erie, Pa.	3.50	
Pacific Electric Co., Los Angeles, Cal.	3.74	8.88	Conestoga Traction Co., Lancaster, Pa.		0.07
Birmingham Ry., Lt. & Pwr. Co., Birmingham, Ala.	0.21		Allegheny Valley Street Ry., New Kensington, Pa.		2.55
Petaluma & Santa Rosa R.R., Petaluma, Cal.		0.03	Citizens Traction Co., Oil City, Pa.	0.90	
San Diego Electric Ry., San Diego, Cal.	1.88		Philadelphia Rapid Transit Co., Philadelphia, Pa.	1.65	
Boulder Street Ry., Boulder, Col.	0.34		Pittsburgh Rys., Pittsburgh, Pa.	1.56	0.03
The Denver & Intermountain R.R., Denver, Col.		0.64	Reading Transit & Lt. Co., Reading, Pa.	0.41	
The Denver Tramway Co., Denver, Col.	0.88	0.46	York Rys., York, Pa.	0.50	
The Trinidad Elec. Transmission Ry. & Gas Co., Trinidad, Col.	3.50		Manila Electric Co., Manila, P. I.	0.95	
The Connecticut Co., New Haven, Conn.		0.26	Charleston Consolidated Ry. & Ltg. Co., Charleston, S. C.	2.44	
New York, New Haven & Hartford R.R. Co., New Haven, Conn.		1.08	Dallas Ry., Dallas, Texas	1.54	
Shore Line Elec. Ry., Norwich, Conn.		25.45	Texas Electric Ry., McKinney, Tex.	1.03	
Washington Ry. & Elec. Co., Washington, D. C.	2.56	1.44	El Paso Electric Ry., El Paso, Tex.	0.33	
Jacksonville Traction Co., Jacksonville, Fla.	0.34		Marshall Traction Co., Marshall, Tex.	0.11	
Municipal Ry. of St. Petersburg, Fla.	0.34		San Antonio Public Service Co., San Antonio, Tex.	0.27	
Columbus Electric & Pwr. Co., Columbus, Ga.	0.72		Wichita Falls Traction Co., Wichita Falls, Tex.	0.40	
Macon Ry. & Light Co., Macon, Ga.		1.00	Rutland Ry., Lt. & Pwr. Co., Rutland, Vt.		1.40
Chicago & Interurban Trac. Co., Chicago, Ill.	0.42		Virginia Ry. & Power Co., Richmond, Va.	0.80	
Chicago, Milwaukee & St. Paul Ry., Seattle, Wash.	0.30		Puget Sound International Ry. & Pwr. Co., Everett, Wash.	9.00	
Chicago Railways, Chicago, Ill.	0.01		Pacific Northwest Trac. Co., Seattle, Wash.		1.43
Rockford & Interurban Ry., Rockford, Ill.		2.42	Seattle Municipal Street Ry., Seattle, Wash.	1.50	
Tri-City Ry. of Ill., Rock Island, Ill.	4.90		Spokane United Rys., Spokane, Wash.	11.79	
Illinois Power Co., Springfield, Ill.	1.05		Yakima Valley Transportation Co., Yakima, Wash.	0.59	
Indiana Service Corp., Fort Wayne, Ind.		4.09	Charleston Interurban R. R., Charleston, W. Va.	0.34	
Tri-City Ry. Co. of Iowa, Davenport, Iowa	1.13		West Virginia Utilities Co., Wheeling, W. Va.	3.50	
Des Moines City Ry., Des Moines, Iowa	0.20		City Ry., Wheeling, W. Va.	5.00	
Dubuque Electric Co., Dubuque, Iowa	1.00		Wisconsin Traction, Lt., Heat & Pwr. Co., Appleton, Wis.		0.04
Waterloo, Cedar Falls & Northern Ry., Waterloo, Iowa		0.11	Wisconsin Public Service Corp., Green Bay, Wis.	0.07	
Kentucky Traction & Term. Co., Lexington, Ky.	0.68		Milwaukee El. Ry. & Lt. Co., Milwaukee, Wis.	0.80	0.18
Louisville & Interurban R. R., Louisville, Ky.		0.17	Sheridan Ry., Sheridan, Wyo.	2.00	
Louisville Railway, Louisville, Ky.	4.14				
New Orleans Public Service, Inc., New Orleans, La.	3.15				
Portland Railroad, Portland, Me.		0.27			
United Rys. & Electric Co., Baltimore, Md.	0.50				
Eastern Mass. Street Ry., Boston, Mass.	2.21	6.61			
Boston Elevated Ry., Boston, Mass.	6.64				
Northampton St. Ry., Northampton, Mass.		0.09			
New Bedford & Onset St. Ry., New Bedford, Mass.		1.00			
Union St. Ry., New Bedford, Mass.		0.05			
Berkshire St. Ry., Pittsfield, Mass.		6.26			
Springfield St. Ry., Springfield, Mass.	0.99				
Department of St. Railways, Detroit, Mich.	2.87				
Detroit United Ry., Highland Park, Mich.		0.48			
Grand Rapids Ry., Grand Rapids, Mich.	0.37				
Jackson Pub. Service Co., Jackson, Miss.	0.50				
Vicksburg Lt. & Traction Co., Vicksburg, Miss.	1.50				
The Helena Light & Ry. Co., Helena, Mont.	2.02				
Dover, Somersetworth & Rochester St. Ry., Dover, N. H.	0.30				
Pennsylvania-New Jersey Ry., Trenton, N. J.		25.00			
Auburn & Syracuse Electric R.R., Auburn, N. Y.	0.25				
Brooklyn City R.R., Brooklyn, N. Y.	1.50				
Southern New York Power & Ry. Corp., Oneonta, N. Y.	2.47				
New York State Rys., Rochester, N. Y.	1.04				
New York State Rys., Syracuse, N. Y.	0.04				
Syracuse & Eastern R.R., Syracuse, N. Y.	0.45				
New York State Rys., Utica, N. Y.	0.39				
Tidewater Power Co., Wilmington, N. C.	1.00				
Cincinnati, Lawrenceburg & Aurora El. St. R.R., Cincinnati, Ohio	0.90				
The Cincinnati Traction Co., Cincinnati, Ohio	1.16				
The Cleveland Ry., Cleveland, Ohio	0.30				
The Dayton & Western Trac. Co., Dayton, Ohio	1.20				
The Indiana, Columbus & Eastern Trac. Co., Springfield, Ohio	4.05	10.30			
Community Traction Co., Toledo, Ohio	1.39				
Cleveland, Painesville & Eastern R.R., Willoughby, Ohio	4.50	5.00			
Shawnee-Tecumseh Traction Co., Shawnee, Okla.	1.91				
Oklahoma Union Ry., Tulsa, Okla.		0.12			
Portland Ry., Lt. & Pwr. Co., Portland, Ore.	0.33	0.06			
Southern Pacific Co. (Portland Div.), Portland, Ore.		0.44			
Panama Electric Co., Panama, Panama	1.27				
North Branch Transit Co., Bloomsburg, Pa.	0.34				

TABLE VII—SUSPENSIONS OF SERVICE—1923

(Includes miles of track on which companies have ceased to operate, but which have not been permanently abandoned or ripped up.)

	Miles
Tucson Rapid Transit Co., Tucson, Ariz.	1.00
Monterey & Pacific Grove Ry. Co., Monterey, Cal.	4.50
The Trinidad Electric Transmission Ry. & Gas Co., Trinidad, Col.	15.50
Shore Line Electric Ry., Norwich, Conn.	13.63
Galesburg & Kewanee Electric Ry., Kewanee, Ill.	14.00
Illinois Power Co., Springfield, Ill.	0.16
Eastern Mass. St. Ry., Boston, Mass.	5.04
Massachusetts Northeastern St. Ry., Haverhill, Mass.	6.22
Lakewood & Coast Electric Co., Lakewood, N. J.	1.00
Public Service Ry., Newark, N. J.	5.00
Orange County Traction Co., Newburgh, N. Y.	20.82
Cleveland Southwestern & Columbus Ry., Cleveland, Ohio	22.50
Columbus Newark & Zanesville El. Ry., Springfield, Ohio	4.80
Indiana Columbus & Eastern Traction Co., Springfield, Ohio	10.45
Youngstown Municipal Ry. Co., Youngstown, Ohio	2.00
Highland Grove Traction Co., McKeesport, Pa.	3.00
Citizens Traction Co., Oil City, Pa.	34.70
Philadelphia Rapid Transit Co., Philadelphia, Pa.	2.86
Northumberland County Ry., Sunbury, Pa.	1.00
United Electric Rys., Providence, R. I.	1.07
South Carolina Lt. & Pwr. & Ry. Co., Spartanburg, S. C.	10.00
Rutland Ry., Lt. & Pwr. Co., Rutland, Vt.	27.10
Hamilton & Dundas Electric Ry., Hamilton, Ont.	5.57
Total for 1923 (eighteen companies)	211.92

minated during the year. These were all small properties, the largest being the Bryan & College Interurban Railway, Bryan, Tex.

In this district, however, there was included as in receivership at the beginning of the year the New Orleans property, due to a technicality regarding the discharge of the receiver. The reorganization which formed the New Orleans Public Service, Inc., was completed and in effect during the latter part of 1922. Accordingly the figures from this property have been deducted under the heading "net changes and corrections" rather than show the road as being in receivership during last year. The property involved consists of 222 miles of track, with outstanding securities consisting of \$30,198,850 in stock, \$38,361,200 in bonds and \$1,180,000 in receiver's certificates.

The number of roads that have terminated receiverships or have been reorganized for the year is not nearly so impressive as are the total amounts of capital and tracks involved. The thirty-one companies that have been returned to their owners total 1,794 miles of track. The securities outstanding for these thirty-one companies before the termination of the receiverships or foreclosures amounted to the imposing total of \$305,265,171. The total of new receiverships or foreclosures to offset this is only \$23,039,166, or less than 8 per cent as much, which shows how rapidly the industry is recovering from its financial difficulties, and

what drastic steps are being taken to place it on a sound financial basis.

Of the roads remaining in the hands of the courts at the close of 1923, comparatively few are of major importance. In the east the New York Railways is the largest of such properties. While it has a relatively small track mileage, the capitalization is large, due to the expensive construction on Manhattan Island.

Another large property still in receivership is the Pittsburgh Railways. Steps are well under way to complete a reorganization, but it was found impossible to complete them before the end of the year. In the South the Birmingham Railway, Light & Power Company still remains in receivership. Progress is being made, and back claims are being paid off, so that it is only a matter of time until its affairs are straightened out.

West of the Mississippi three large properties remain in the list, those in St. Louis, Kansas City and Denver. Much progress is reported in straightening out the affairs in these cities. It appears probable that one or more of the properties will be out of receivership before the close of this year.

The San Francisco-Oakland Terminal Railways was sold at foreclosure during the year, and now is undergoing a reorganization, the announced plan of which will reduce greatly the outstanding securities. The road has not, however, gone through a receivership and the plan has the approval of the State Railroad Commission.

More Cars Ordered During 1923 Than Any Year Since 1913

Passenger Cars Arranged for Either One-Man or Two-Man Operation Constitute Nearly 50 per Cent of the Total of New Cars for City Service—The Number of Single-Truck Safety Cars Ordered Fell Off 60 per Cent, While Orders for One-Man Double-Truck Cars Decreased Slightly from Last Year

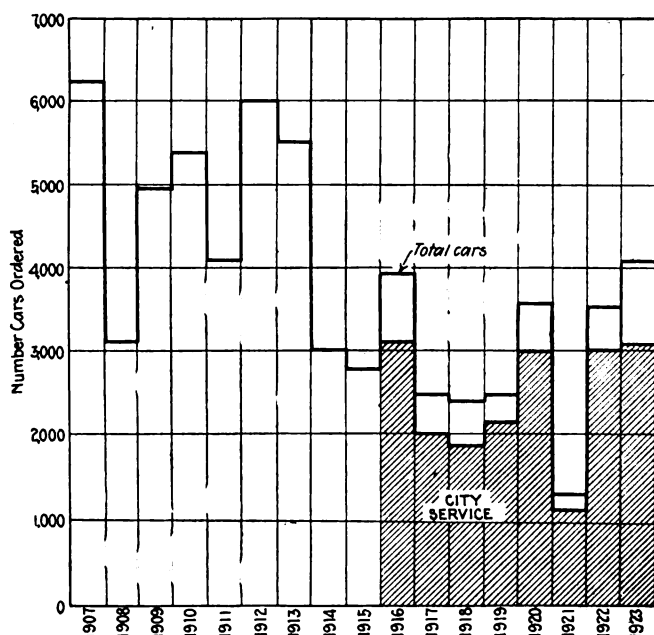
THE statistics for new electric rolling stock given in the following tables show in a very striking manner that the electric railway industry is getting ahead and is able to do considerable buying. A large increase in buying of cars began last year and 1923 has exceeded 1922. The total of 4,029 new cars and locomotives ordered during 1923 exceeds the high level of 1916, which was 3,942 cars. The purchases of cars this year indicate a promising future for increased earnings, better service and more passengers.

In considering the various types of cars ordered, the outstanding feature is that 1,114 cars of the one-man two-man type were purchased. Of these 1,076 were for city service and 38 for interurban operation. The total of this type for city service is nearly 50 per cent of all the passenger cars ordered for that service. The one-man single-truck cars with 28-ft. body, which are quite universally known as safety cars, are still being bought, but the number decreased materially. There were 312 of this type purchased during 1923, as compared with 772 for 1922 and 565 for 1921. There were also 239 one-man cars bought with bodies longer than 28 ft. Of these latter 184 had double trucks and 55 were single-truck cars. Of the one-man double-truck cars 56 were purchased for interurban service.

A comparison of these figures with similar ones for passenger cars ordered during the year 1922 shows some interesting facts. The total number of double-truck one-man and one-man two-man cars ordered for city service in 1922 was 627. This is 25.6 per cent of the total number of city passenger cars purchased during that year. A similar comparison of the single-truck one-man cars ordered during 1922 shows a total of 845, or 34.5 per cent of the total city passenger cars purchased. Now, considering the numbers of these types purchased during 1923, we see that while the number of single-truck one-man cars has decreased from 34.5 per cent of the total to 12.2 per cent, the number of double-truck one-man and one-man two-man cars has increased from 25.6 per cent to 41.2 per cent in 1923. There has thus been a decided tendency toward the use of double-truck cars for one-man operation.

The one-man two-man type of car made its first appearance last year and 480 were ordered. The increased popularity of this type is shown by the fact that 1,114 were ordered during 1923. These cars range in length from 38 ft. to 47 ft. 8 in., with a weighted average of about 45 ft. The double-truck one-man cars range in length from 39 ft. 1 in. to 49 ft. 2 in.

A new feature of the tabulation of car data this year



New Cars and Locomotives Ordered by Years. The Division Into City and Interurban Cars Is Not Made Prior to 1916

is that the number of motors per car is included. Aside from the 520 cars ordered by the Philadelphia Rapid Transit Company, nearly all the double-truck cars are equipped with four motors.

There were sixteen electric railways that ordered fifty or more cars. Of these the Philadelphia Rapid Transit Company ordered 385 one-man two-man, 135 two-man and fifty-six miscellaneous cars; the Brooklyn City railroad ordered 200 one-man two-man cars, the city of Detroit and the Cleveland Railways each ordered 100 two-man motor cars and fifty trailers, the Boston Elevated Railway ordered 145 one-man two-man cars, the Long Island Railroad ordered 140 motor cars for train service, the Toronto Transportation Commission ordered sixty two-man motor cars and sixty-five trailers and the New Orleans Public Service Corporation ordered 112 two-man passenger cars and six dump cars.

TABLE I—NEW ROLLING STOCK ORDERED SINCE 1907

Year	Passenger Cars—City	Interurban	Freight and Miscellaneous Cars	Electric Locomotives	Total
1907	3,483	1,327	1,406	(a)	6,216
1908	2,208	727	176	(a)	3,111
1909	2,537	1,245	1,175	(a)	4,957
1910	3,571	990	820	(a)	5,381
1911	2,884	626	505	(a)	4,015
1912	4,531	783	687	(a)	6,001
1913	3,820	547	1,147	(a)	5,514
1914	2,147	384	479	(a)	3,010
1915	2,072	336	374	(a)	2,782
1916	3,046	374	491	31	3,942
1917	1,998	185	223	49	2,455
1918	1,842	255	278	44	2,419
1919	2,129	128	172	18	2,447
1920	2,889	227	465	17	3,598
1921	1,059	129	81	7	1,276
1922	2,912	187	405	34	3,538
1923	2,915	427	595	92	4,029

(a) Included in "Freight and Miscellaneous Cars."

TABLE II—SPECIAL COMPARISON OF NEW ROLLING STOCK ORDERS BY YEARS

	1923	1922	1921	1920	1919	1918	1917	1916
Number of railways reporting new cars.....	167	145	94	172	160	140	182	250
<i>City Service</i>								
Number of one-man cars (28 ft. body S.T.).....	312	772	565	1,699	1,383	644	280	187
Number of one-man cars other than 28 ft. body..	183	227	.....	.....	.....	.....	.....	.....
Number of one-man, two-man cars.....	1,076	471	.....	.....	.....	.....	.....	.....
Number of two-man passenger motor cars*.....	1,097	1,290	383	847	635	1,068	1,316	2,731
Number of passenger trailers.....	247	150	111	343	111	130	402	128
Service cars.....	121	103	47	104	31	(a)	(a)	(a)
Total cars city service...	3,036	3,015	1,106	2,993	2,160	1,842	1,998	3,046
<i>Interurban Service</i>								
Number of one-man cars..	56	40	.....	.....	.....	.....	.....	.....
Number of one-man, two-man cars.....	38	9	.....	.....	.....	.....	.....	.....
Number of two-man motor cars*.....	330	122	103	195	96	200	158	303
Number of passenger trailers.....	3	16	26	32	32	55	27	71
Number of freight, express and miscellaneous cars..	474	302	34	361	141	(a)	(a)	(a)
Total cars interurban service.....	901	489	163	588	269	255	185	374
Total number of cars.....	3,937	3,538	1,269	3,581	2,429	2,375	2,406	3,911
Number of electric locomotives.....	92	34	7	17	18	44	49	31

* Includes motor and trail cars for subway, elevated and train service.

(a) Not available.

Aside from these there were two other companies that ordered 100 cars each, one ordered seventy-five cars, another seventy cars and four others fifty cars each. This year's figures contain six orders for rapid tran-

Table III—Details of Rolling Stock Ordered During 1923
New England District

Name of Railway	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Over All Ft. In.	Seating Capacity	Total Wt. Light Tons	No. Motors	No. Cars Junked During Year
Connecticut											
The Connecticut Co.....	50	Passenger	City	Motor	Double	Either	44—0	47	16.00	4	102
The Shore Line Electric Ry.....	5	Passenger	Interurban	Motor	Double	Either	40—3	46	16.50	4	5
New Haven & Shore Line Ry.....	2	Trans.	Interurban	Motor	Double	.....	49—0	.....	33.00	.....	.....
Maine											
Somerset Traction Co.....	1	Passenger	City	Motor	Single	One	29—0	34	.....	2	1 IM
Androsoggin & Kennebec Ry.....	5	Passenger	City	Motor	Double	Two	40—3	46	14.50	4	.....
Cumberland County Power & Light Co.....	6	Passenger	City	Motor	Double	Either	40—3	46	16.50	4	.....
Massachusetts											
Worcester Cons. St. Ry.....	1	Freight	City	Motor	Double	.....	45—0	.....	22.50	4	.....
.....	10	Passenger	City	Motor	Double	Either	44—0	44	22.00	4	1 CM
.....	1	Dump	City	Motor	Double	.....	40—6	.....	26.00	4	.....
.....	145	Passenger	City	Motor	Double	Either	45—0	48	15.70	4	165
.....	1	Flat	City	Motor	Double	.....	.....	.....	.....	4	.....
Boston Elevated Ry.....	1	Trailer	City	Motor	Double	.....	.....	.....	.....	.....	.....
.....	1	Work Car	City	Motor	Double	.....	.....	.....	.....	4	.....
.....	1	Flat	City	Trailer	Single	.....	.....	.....	.....	.....	.....
Milford & Uxbridge St. Ry.....	6	Passenger	Interurban	Motor	Double	Either	40—3	44	16.00	4	47 CM
Springfield Street Ry.....	10	Passenger	City	Motor	Double	Two	48—4	48	21.10	4	26 CM
Berkshire St. Ry.....	6	Passenger	City	Motor	Double	Two	44—0	44	15.00	4	9 CM
Union St. Ry.....	6	Passenger	City	Motor	Double	Either	41—31	41	16.15	4	.....
Eastern Massachusetts St. Ry.....	50	Passenger	City	Motor	Double	One	28—01	33	8.00	2	.....
Nashua St. Ry.....	1	Plow	City	Motor	Single	.....	.....	.....	.....	2	.....
Massachusetts Northeastern St. Ry.....	5	Passenger	City	Motor	Double	Either	41—41	42	16.50	4	.....
New Hampshire											
Keene Electric Ry.....	1	Passenger	City	Motor	Single	One	28—01	33	8.00	2	.....
Total for New England District.....	310										

Table III—Details of Rolling Stock Ordered During 1923—(Continued)

North of the Ohio and East of the Mississippi River

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Over All Ft. In.	Seating Capacity	Total Wt. Light Tons	No. Motors	No. Cars Junked During Year
District of Columbia											
Washington Ry. & Electric Co.	30	Passenger	City	Motor	Double	Two	42— 3	44	18.80	2	30 CM
Illinois											
Aura, Elgin & Chicago Ry. Co. Fox River Div.	40	Passenger	City	Motor	Single	One	28— 0	32	9.00	2	
	7	Passenger	Interurban	Motor	Double	Either	38— 0	52	18.00	4	
Chicago Surface Lines	23	Passenger	City	Motor	Double	Two	48—11	54	23.00	4	
	7	Passenger	City	Trailer	Double		47— 6	62	13.00		
Central Illinois Traction Co.	2	Passenger	Interurban	Motor	Double	One	46— 0	44	14.00	4	
Chicago & Joliet Electric Ry.	10	Passenger	City	Motor	Double	One	43— 7	45	15.00	2	
Rockford & Interurban Ry.	4	Passenger	City	Motor	Double	Two	47— 0	44	20.00	4	1 IT
Chicago and West Towns Ry.	10	Passenger	City	Motor	Double	Two	46— 0	44	17.50	4	
Chicago Elevated R.R.	5	Passenger	City	Motor	Double	Train	48— 0	52		2	4 El. M
	7	Passenger	Interurban	Motor	Double	Two	55— 31	54	51.35	4	4 CM
	3	Parlor	Interurban	Trailer	Double		55— 31	29	40.00		1 Wk. T
Chicago, North Shore & Milwaukee R.R.	20	Express	Interurban	Motor	Double		50— 0		37.25	4	
	15	Gondola	Interurban	Trailer	Double		45—10		22.65		
	1	Gondola	Interurban	Trailer	Double		45—10		22.35		
	1	Plow	Interurban	Motor	Single		49— 1		15.00		
	1	Service	Interurban	Motor	Double		50— 0		47.50		
	4	Passenger	City	Motor	Double	Two	45— 0	48	16.00	4	1 IM
	1	Passenger	City	Motor	Double	Two	52— 2	61	24.00	4	
East St. Louis & Suburban Ry.	4	Passenger	Interurban	Motor	Double	Two	53— 8	60	25.50	2	
	3	Passenger	Interurban	Motor	Double	Two	53— 8	58	29.94	4	
	1	Dump	Interurban	Motor	Double		40— 6		22.50	4	
	1	Dump	Interurban	Trailer	Double		40— 6		16.00		
Bloomington & Normal Ry. & Lt. Co.	10	Passenger	City	Motor	Single	One	28— 01	32	8.00	2	
	10	Passenger	City	Motor	Single	One	29— 41	32	8.00	2	
Illinois Traction System	17	Passenger	Interurban	Motor	Double	One		52	18.00	4	
	10	Passenger	City	Motor	Single	One		34	7.25	2	
Indiana											
Union Trac. Co. of Indiana	5	Box	Interurban	Trailer	Double				19.00		
	5	Flat	Interurban	Trailer	Double				13.50		
Beech Grove Traction Co.	1	Passenger	City	Motor	Single	One	28— 01	32	8.00	2	
	15	Passenger	City	Motor	Double	One	40— 0	48	16.00	4	
Indiana Service Corporation	10	Passenger	Interurban	Motor	Double	Two	53— 0	51	24.00	4	
	10	Dump	Interurban	Trailer	Double		40— 6		16.00		
Fort Wayne, Van Wert & Lima Trac. Co.	10	Box	Interurban	Trailer	Double		38— 0		17.00		
Indianapolis & Cincinnati Traction Co.	12	Passenger	Interurban	Motor	Double	Two	60— 0	54	36.00	4	
	3	Parlor	Interurban	Motor	Double	Two	62— 0	22			
Interstate Public Service Co.	25	Frt., Box	Interurban	Trailer	Double		41— 9				
	15	Stock	Interurban	Trailer	Double		39— 7				
	4	Ballast	Interurban	Trailer	Double		40— 0				
Terre Haute, Indianapolis & Eastern Traction Co.	10	Frt., Box	Interurban	Trailer	Double		40— 1				19 CE
Chic., South Bend & Northern Indiana Ry.	1	Serv. Car	City	Motor	Single		28—10		9.50		8 CM
	2	Wk. Cars	Both	Motor	Double		36— 6		12.50		
Vincennes Elec. Ry.	1	Passenger	City	Motor	Single	One	28— 01	32	7.50	2	
Southern Indiana Gas & Elec. Co.											
Gary St. Ry.	5	Passenger	City	Motor	Single	One	27— 9	32		2	1 Box
Maryland											
United Railways & Elec. Co.	2	Passenger	City	Motor	Double	Two	48— 21	52	22.00	4	
The Potomac Public Service Co.	4	Passenger	Interurban	Motor	Double	Two	44— 0	48	20.00	4	2 IM
Michigan											
City of Detroit—Dept. of St. Railways	100	Passenger	City	Motor	Double	Two	48— 5	52	18.50	4	58 CM
	50	Passenger	City	Trailer	Double		48— 0	55	13.00		
	2	Dump	City	Motor	Double		40— 6		22.50	4	
	2	Dump	City	Trailer	Double		40— 6		16.00		
Lake Superior District Power Co.	4	Passenger	City	Motor	Single	One	32— 0	31	7.50	2	3
	5	Passenger	Interurban	Motor	Double	One	40— 0	44	12.00	4	
Grand Rapids Ry.	8	Passenger	City	Motor	Single	One	28— 01	32	7.50	2	6 Service 5 CM..
New Jersey											
Burlington County Transit Co.	1	Passenger	Interurban	Motor	Double	Two	42— 6	42	19.00	4	
	1	Flat	Interurban	Trailer	Double						
	1	Sweeper	Interurban	Motor	Double						
	1	Work	Interurban	Motor	Single						
Cumberland Traction Co.	5	Passenger	City	Motor	Single	One	28— 01	33	8.46	2	
West Jersey & Seashore R.R.	1	Passenger	Interurban	Motor	Double	Either	40— 3	50	14.98	4	
Public Service Ry.	16	Passenger	City	Motor	Double	Two	47— 8	52	19.10	4	
		Passenger	City	Motor	Double	Two	44— 0	48		4	
New York											
Fonda, Johnstown & Gloversville R.R.	2	Passenger	City	Motor	Double	Either	46— 0	52	18.00	4	
	1	Passenger	Interurban	Motor	Double	Two	52— 9	54	24.00	4	
The Brooklyn City R. R.	200	Passenger	City	Motor	Double	Either	44— 0	53	18.75	4	
New York Rapid Transit Corp.	50	Passenger	City	Trailer	Double	Train	67— 0	80	40.00		
Hudson & Manhattan R.R.	25	Passenger	City	Motor	Double	Train	51— 0	44	37.00	2	
New York Central R.R.	30	Passenger	Interurban	Motor	Double	Train	69— 5	82	64.50	2	
Penn. R.R. System	2	Passenger	Interurban	Motor	Double	Two	47— 8	52	20.35	2	
Niagara Junction Ry.	1	Work car	Interurban	Motor							
Schenectady Ry.	1	Sweeper	City	Motor	Double		40— 0		22.00		1 CM
	1	Plow	Interurban	Motor	Double				31.00		
New York State Rys.											71 CM
Interborough Rapid Transit Co.	100	Passenger	City	Motor	Double	Train	51— 0	46	37.75	2	1 Ex M
Richmond Light & R.R. Co.	1	Plow	City	Motor	Double					4	
Long Island R.R.	140	Passenger	Interurban	Motor	Double	Train	63— 41	78	57.50	2	65 CM
Geneva, Seneca Falls & Auburn R.R.	1	Passenger	City	Motor	Single	One	28— 01	33	8.00	2	
Ohio											
City of Ashtabula, Div. of St. Rys.											
Cincinnati, Georgetown & Portsmouth R. R.	2	Passenger	Interurban	Motor	Double	One	40— 0	47	13.00	4	6 CM
Cleveland So. Western & Columbus Ry.	12	Passenger	Interurban	Motor	Double	Two	46— 3	50	17.00	4	4 TM
The Ohio Public Service Co.	3	Passenger	City	Motor	Single	One	28— 01	33	9.00	2	2 CM
The Columbus, Marion & Bucyrus Ry.											1 IT
The Community Traction Co.											1 CM
The Cleveland Ry.	100	Passenger	City	Motor	Double	Two	52— 51	56	22.10	4	
	50	Passenger	City	Trailer	Double		49— 2	60			
	4	Dump	City	Motor	Double		40— 6		22.50	4	
	2	Dump	City	Trailer	Double		40— 6		16.00		
Pennsylvania-Ohio Electric Co.	12	Passenger	City	Motor	Double	One	43—101	49	18.61	4	
Springfield & Xenia Ry.	5	Passenger	City	Motor	Single	One	28— 01	33	8.15	2	
Western Ohio Ry.	1	Flat	Interurban	Trailer	Double		39— 6				
Northern Ohio Traction & Lt. Co.	12	Passenger	Interurban	Motor	Double	Two	45— 01	48	16.22	4	1 Flat
	4	Freight	Interurban	Trailer	Double		42— 61				
Northwestern Ohio Ry. & Pwr. Co.	4	Passenger	Interurban	Motor	Double	Two	47— 4	56	18.21	4	
	1	Plow	Interurban	Trailer	Double		49— 0		20.00		
Indiana Columbus & Eastern Tr. Co.	6	Passenger	Interurban	Motor	Double	Two	54— 81	58	25.42	4	
Toledo, Bowling Green & Southern Tr. Co.	6	Freight	Interurban	Trailer	Double		42— 61		16.88		
Lake Shore Electric Ry.	10	Freight	Interurban	Trailer	Double		55— 0				
Steubenville, East Liverpool & Beaver Valley Tr. Co.	1	Dump	Interurban	Motor	Double		40— 6		22.50	4	
City Ry.	10	Passenger	City	Motor	Double	One	42— 6	51		4	

Table III—Details of Rolling Stock Ordered During 1923—(Continued)
North of the Ohio and East of the Mississippi River—Continued

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Over All Ft. In.	Seating Capacity	Total Wt. Light Tons	No. Motors	No. Cars Junked During Year
Pennsylvania											
Northampton Transit Co.	8	Passenger	Interurban	Motor	Double	Either	44—8	48	15.00	4	3 sold
Buffalo & Lake Erie Traction Co.	1	Snow plow	City	Motor	Double		40—0				10 CM
Schuylkill Ry.	2	Passenger	Interurban	Motor	Double	Two	47—0	52	24.64	4	31M 5 open
Harrisburg Rys.	3	Passenger	Interurban	Motor	Double	Two	45—6½	56	18.00	4	
Indiana County St. Rys.	4	Passenger	Interurban	Motor	Double	Two	45—9	48	16.00	4	
The Lewistown & Reedsville Elec. Ry.	6	Passenger	City	Motor	Single	One	28—0½	33	8.41	2	
The Citizens Traction Co.	75	Passenger	City	Motor	Double	Two	45—0	56	17.00	4	
Pittsburg Rys.	4	Dump	City	Motor	Double		40—6		22.50	4	
Reading Transit & Lt. Co.	6	Passenger	Both	Motor	Double	Either	45—0	52	17.00	4	8 open, 1 sand
Lackawanna & Wyoming Valley R.R.	4	Passenger	Interurban	Motor	Double	Two	60—6	72	37.00	2	
Danville Traction & Pwr. Co.	5	Passenger	City	Motor	Double	Either	39—8	40	16.30	4	
York Rys.	10	Passenger	City	Motor	Single	Two	34—11½	38	10.98	2	
Scranton Ry.	1	Sweeper	Both	Motor	Single		27—4½		15.80	2	
	385	Passenger	City	Motor	Double	Either	45—6	52	17.71	2	9 CM
	135	Passenger	City	Motor	Double	Two	45—6	48	18.81	2	247 CM
	24	Plows	City	Motor	Double		45—6			4	110 CT
	8	Sweepers	City	Motor	Double		44—4			4	
Philadelphia Rapid Transit Co.	10	Dump	City	Motor	Double		35—6		26.64	4	
	5	Dump	City	Trailer	Double		35—6		18.26		
	6	Work	City	Motor	Double		44—6			4	
	1	Crane	City	Motor	Double		44—6			4	
	1	Crane	Elevated	Motor	Double		44—6			4	
	1	Line	City	Motor	Double		44—6			4	
Conestoga Traction Co.	12	Passenger	City	Motor	Single	One	30—1	30	8.80	2	
Wilkes-Barre Ry.	5	Passenger	Interurban	Motor	Double	One	44—5	48	15.50	4	
Eastern Pennsylvania Pwr. & Ry. Co.	10	Passenger	City	Motor	Double	Either	45—0	48	18.75	4	
Fairchance & Smithfield Traction Co.	2	Passenger	Interurban	Motor	Double	Either	45—0	48	16.50	4	
Warren & Jamestown St. Ry.	1	Passenger	City	Motor	Single	One	28—0½	33	8.18	2	
Altoona & Logan Valley El. Ry.	3	Passenger	Interurban	Motor	Double	Two	45—1½	48		4	
Beaver Valley Traction Co.	8	Passenger	Interurban	Motor	Double	Two	50—8½	56	28.75	4	
	6	Passenger	Interurban	Motor	Double	Either	41—0	38	15.75	4	
West Penn. Rws.	2	Passenger	Interurban	Motor	Double	Two	58—0	70		4	
	2	Passenger	Interurban	Motor	Double	Two	58—0	62		4	
	17	Passenger	City	Motor	Double	One	42—2	44		4	
Wisconsin											
Wisconsin Public Service Corp.	6	Passenger	Interurban	Motor	Double	One	43—9	46	15.00	4	1 CM
	1	Passenger	City	Motor	Single	One	28—0½	32	7.50	2	
Eastern Wisconsin Electric Co.	5	Passenger	Interurban	Motor	Double	One	43—0	44	17.00	4	11M
	4	Passenger	City	Motor	Single	One	27—10	32	9.00	2	
Lake Superior District Pwr. Co.	4	Passenger	City	Motor	Single	One	28—0½				21M
Milwaukee El., Ry. & Lt. Co.	5	Passenger	Interurban	Motor	Double	Two					
	1	Dump	City	Trailer	Double		40—0		16.00		
Total North of the Ohio and East of the Mississippi River											
	2,191										

South of the Ohio and East of the Mississippi River

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Overall Ft. In.	Seating Capacity	Total Wt. Light Tons	No. Motors	Cars Junked During Year
Alabama											
Mobile Light & Railroad Co.	2	Flat	Interurban		Double		34—0		6.50		1 CM
Birmingham Ry., Lt., & Pwr. Co.	20	Passenger	City	Motor	Double	Two	49—5	62		4	
	2	Dump	City	Motor	Double		40—6		22.50	4	
	1	Dump	City	Trailer	Double		40—6		16.00		
Alabama Power Co.	3	Passenger	City	Motor	Single	One	28—0½	32	8.00	2	2 CM
Florida											
	1	Passenger	Both	Motor	Double	One	40—0	48	13.75	4	
Municipal Ry. of St. Petersburg	3	Passenger	Both	Motor	Single	One	28—0½	32	8.25	2	
	5	Flat	Interurban	Trailer							
	2	Service	Interurban	Motor	Single						
	2	Work		Motor	Single						
Jacksonville Traction Co.	13	Passenger	City	Motor	Single	One	28—0½	32	7.50	2	24 CM
Tampa Electric Co.	8	Passenger	City	Motor	Single	One	28—0½	32	8.00	2	
Miami Beach Ry.	6	Passenger	City	Motor	Single	One	28—0½	32	8.00	2	
Georgia											
Georgia Ry. & Pwr. Co.	20	Passenger	City	Motor	Double	Two	44—6	48	19.00	4	20 CM
	1	Ser. Flat	City	Motor	Double		40—0				
	1	Ser. Flat	City	Trailer	Double		40—0				
Savannah Electric & Pwr. Co.	8	Passenger	City	Motor	Single	One	28—0½	32	8.00	2	12 CM
Augusta-Aiken Ry. & Electric Corp.	15	Passenger	City	Motor	Single	One	28—4	32	8.50	2	
	1	Express	Interurban	Motor	Double		45—0		26.00		
Kentucky											
	15	Passenger	City	Motor	Double	Either	44—0	46	18.45	4	40 CM
Louisville Ry.	25	Passenger	City	Trailer	Double		41—5	60	12.25		6 CT
	1	Work	City	Motor	Double		40—6			4	
	2	Work	City	Trailer	Double		40—6				
Kentucky Traction & Terminal Co.	27	Passenger	City	Motor	Single	One	26—2	28	8.00	2	16
	2	Passenger	Interurban	Motor	Double	One	40—3	45	12.55	4	
North Carolina											
Durham Public Service Co.	4	Passenger	City	Motor	Double	One	39—1	49	15.00	4	3 CM
Piedmont & Northern Ry.	2	Passenger	City	Motor	Single	One	28—0½	33	8.55	2	
South Carolina											
Columbia Ry. Gas & Electric Co.	6	Passenger	City	Motor	Single	One	28—0½	33	8.46	2	
Tennessee											
Jackson Ry. & Lt. Co.	3	Passenger	City	Motor	Single	One	28—0½	32	8.00	2	
Knoxville Pwr. & Lt. Co.	7	Passenger	City	Motor	Single	One	26—9	29		2	
	7	Passenger	City	Motor	Double	One	42—9	52		4	
Virginia											
Radford Water Pwr. Co.	1	Passenger	City	Motor	Single	One	28—0½	32	8.27	2	
Virginia Ry. & Pwr. Co.	20	Passenger	City	Motor	Single	One	28—0½	33	8.32	2	
Danville Traction & Pwr. Co.	5	Passenger	City	Motor	Double	Two	39—8	40	16.00	4	
West Virginia											
Monongahela-West Penn Public Service Co.	2	Passenger	Interurban	Motor	Double	Two	57—0	72	25.00	4	12
	17	Passenger	City	Motor	Double	One	42—0	48	14.50	4	
	40	Passenger	Both	Motor	Double	Either	47—0	48	17.40	4	
Ohio Valley Electric Ry.	1	Dump	Both	Motor	Double		40—0		22.50	4	
	2	Dump	Both	Motor	Double		40—0		16.00		
Tygarts Valley Traction Co.	2	Passenger	City	Motor	Single	One	28—0½	33	8.80	2	
Sistersville & New Martinsville Tr. Co.	3	Passenger	Interurban	Motor	Double	Either	42—9	46	16.50	4	
City Ry.											
Wheeling Public Service Co.											
Total South of the Ohio and East of the Mississippi River.											
	308										29 CM 4 CM

Table III—Details of Rolling Stock Ordered During 1923—(Continued)

West of the Mississippi River

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Over All Ft. In.	Seating Capacity	Total Wt. Light Tons	No. Motors	No. Cars Junked During Year
Arkansas											
Southwestern Gas & Electric Co.	2	Passenger	City	Motor	Single	One	28—0	32	8.00	2	2 CM
California											
San Francisco, Napa & Calistoga Ry.	1	Work	Interurban	Motor	Double	Two	30—0	60	30.00	4	9 CM
Pacific Electric Ry.	50	Passenger	City	Motor	Double	Two	57—4	65	45.00	4	57 Frt.
	50	Passenger	City	Motor	Double	Two	52—2	65	29.00	4	9 Service
	200	Gondola	Interurban	Motor	Double	Two	43—1	54	23.75	4	1 CM
	50	Passenger	Both	Motor	Double	Either	47—8	54	19.70	4	1 CM
San Diego Electric Ry.	15	Passenger	Interurban	Motor	Double	Two	57—7	68	30.00	2	
Santa Barbara and Suburban Ry.	55	Passenger	City	Motor	Double	Either	44—10	48	20.50	4	
San Francisco-Oakland Terminal Rys.	30	Passenger	City	Motor	Double	Two	47—0	50	18.85	4	7 CM
Market St. Ry.	2	Work	City	Motor	Double	Two	40—6	44	27.60	4	
Pacific Gas & Electric Co.	5	Passenger	City	Motor	Double	One	41—6	44	14.00	2	
Glendale & Montrose Ry.	3	Passenger	City	Motor	Double	One	43—3	46	18.00	4	
Colorado											
The Denver & Intermountain R.R. Co.	10	Passenger	City	Motor	Double	Two	46—0	59	21.30	4	2 I. Gond.
The Denver Tramway Co.	3	Box	Interurban	Motor	Double	Two	28—0	32	8.00	2	19 CM
Grand River Valley Ry.	6	Passenger	City	Motor	Single	One	28—0	32	8.00	2	4 CT
Southern Colorado Power Co.	1	Passenger	City	Motor	Single	One	28—0	32	8.00	2	
Western Lt. & Pwr. Co.	1	Passenger	City	Motor	Single	One	28—0	32	8.00	2	
Iowa											
Des Moines City Railway	10	Passenger	City	Motor	Double	Two	46—0	52	19.00	4	
	2	Dump	City	Motor	Double	—	40—6	—	22.50	4	
Dubuque Electric Co.	4	Passenger	City	Motor	Single	One	28—0	32	8.00	2	6 CT.
Peoples Gas & Electric Co.	4	Passenger	City	Motor	Single	One	32—0	30	8.00	2	
Burlington Ry. & Lt. Co.	4	Passenger	City	Motor	Single	One	32—0	30	8.00	2	
Kansas											
Topeka Ry.	10	Passenger	City	Motor	Single	One	28—0	35	8.00	2	
Kansas El. Pwr. Co.	5	Passenger	City	Motor	Single	One	28—0	32	8.00	2	
Louisiana											
Shreveport Rys.	7	Passenger	City	Motor	Single	One	28—0	32	7.15	2	
	112	Passenger	City	Motor	Double	Two	47—8	52	20.00	2	
New Orleans Public Service Inc.	3	Dump	City	Motor	Double	Two	40—6	44	22.50	4	
	3	Dump	City	Trailer	Double	—	40—6	—	16.00	—	
Minnesota											
Wisconsin Railway Light & Power Co.											2
Missouri											
Jefferson City Bridge & Transit Co.											2 CM
Kansas City, Clay County & St. Joseph Ry.											1 Ft. T
The Kansas City Railways	2	Dump	City	Motor	Double	—	40—6	—	22.50	4	
	2	Dump	City	Trailer	Double	—	40—6	—	16.00	—	
United Railways Co. of St. Louis	100	Passenger	City	Motor	Double	Two	50—6	60	19.79	4	9 CM
St. Joseph Ry., Lt., Ht., & Pwr. Co.	12	Passenger	City	Motor	Single	One	28—0	35	8.00	2	
Montana											
Anaconda Copper Mining Co.											2 CM, 5 CT
North Dakota											
Northern States Power Co.	1	Passenger	City	Motor	Single	One	30—0	32	9	2	
Oklahoma											
Muskogee Electric Tr. Co.	6	Passenger	City	Motor	Single	One	28—0	38	8.00	2	6 CM
Oklahoma Ry.	20	Passenger	City	Motor	Single	One	28—0	32	8.00	2	
	10	Gondola	Interurban	Motor	Double	—	38—0	—	—	—	
Oregon											
Portland Ry. Lt. & Pwr. Co.	80	Flat	Interurban	Trailer	Double	—	—	—	—	—	4 CM
South Dakota											
Sioux Falls Traction System											4 CM
Texas											
The Abilene Traction Co.	1	Passenger	City	Motor	Single	One	28—0	32	8.00	2	
Eastern Texas Electric Co.	7	Passenger	City	Motor	Double	One	41—8	48	—	4	3 CM
Dallas Ry.	30	Passenger	City	Motor	Double	Either	45—6	50	17.00	4	
	10	Passenger	City	Motor	Double	One	40—1	48	14.00	4	29 CM
Northern Texas Trac. Co.	1	Passenger	City	Motor	Single	One	28—0	32	8.00	2	
Marshall Traction Co.											1 CM
El Paso Electric Ry.											3 CM
San Antonio Public Service Co.	10	Passenger	City	Motor	Double	Two	43—3	48	14.00	4	15 CM
Galveston Electric Co.	8	Passenger	City	Motor	Single	One	28—0	32	8.50	2	
Houston Electric Co.	10	Passenger	City	Motor	Double	One	40—1	44	14.00	4	
Utah											
Salt Lake & Utah R.R.											4 Box
Washington											
Spokane United Rys.											5 CM
Puget Sound International Ry. & Pwr. Co.											1 CM
											1 Line
Pacific Northwest Traction Co.											1 Dump
Total West of the Mississippi River	953										

Dominion of Canada

New Brunswick											
Morriston Tramways, Elec. & Gas Co., Ltd.	2	Passenger	City	Motor	Double	Two	47—8	44	24.00	4	
Nova Scotia											
Cape Breton Elec. Co. Ltd.	2	Passenger	City	Motor	Single	One	28—0	32	6.25	2	
	1	Flat	City	Trailer	Double	—	32—0	—	9.00	—	
	1	Plow	City	Motor	Single	—	28—3	—	—	—	
Ontario											
Cornwall St. Ry., Lt. & Pwr. Co.	1	Passenger	City	Motor	Single	One	—	24	—	2	1 CM
The London St. Ry. Co.	5	Passenger	City	Motor	Single	One	28—9	33	9.00	2	4 CM
											5 CT
Toronto Transportation Commission	60	Passenger	City	Motor	Double	Two	51—10	57	23.60	4	190 CM
	65	Passenger	City	Trailer	Double	One	49—2	60	13.40	—	48 CT
Hydro-Electric Rys.	12	Passenger	City	Motor	Double	Either	46—2	52	22.00	4	
Kitchener & Waterloo St. Ry.	2	Passenger	City	Motor	Single	One	30—10	36	7.75	2	
Oshawa Ry.	2	Passenger	City	Motor	Double	Two	47—8	44	24.00	4	
Ottawa Electric Ry.	1	Tower	City	Motor	Single	—	29—0	—	12.50	2	
Quebec											
Montreal & Southern Counties Ry.	2	Passenger	Interurban	Motor	Double	Two	56—0	60	30.50	4	
	2	Passenger	Interurban	Trailer	Double	—	56—0	60	21.50	—	
	1	Passenger	Interurban	Trailer	Double	—	50—0	54	27.50	—	
	1	Baggage	Interurban	Motor	Double	—	50—0	—	21.00	4	
Quebec Ry., Lt. & Pwr. Co.	10	Passenger	City	Motor	Single	One	30—9	32	8.25	2	12 CM
Three Rivers Traction Co.	1	Sweeper	City	Motor	Single	—	29—0	—	12.50	2	
Saskatchewan											
Moose Jaw Elec. Ry. Co. Ltd.	1	Passenger	City	Motor	Double	One	40—0	50	—	2	
	1	Plow	City	Motor	—	—	—	—	—	—	
	1	Service	City	Motor	—	—	—	—	—	—	
	1	Work	City	Motor	—	—	—	—	—	—	
Total for Canada	175										

Table V—Cars Rebuilt During 1923
New England District

Railway	Number	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Over All Ft. In.	Seating Capacity	Total Weight Light (tons)	Number of Motors
Connecticut										
The Connecticut Co.	5	Sweepers	Both	Motor	Double					
Waterbury & Milldale Tramway Co.	4	Flat	Both	Trailer	Double					
	4	Passenger	City	Motor		One				
Maine										
Cumberland County Pwr. & Lt. Co.	10	Passenger	City	Motor	Double	Either				
Massachusetts										
E. Massachusetts St. Ry.	2	Sweepers	Both	Motor	Double		42—0		25.00	
Worcester Cons. St. Ry.	6	Sweepers	City	Motor	Double					
Springfield Street Ry.	5	Sweepers	City	Motor	Double					
Holyoke Street Ry.	1	Service	City	Motor	Single					
Union Street Ry.	13	Passenger	City	Motor						
Total for New England District	52									

North of the Ohio and East of the Mississippi River

Illinois										
Chicago & Interur. Tr. Co.	1	Freight	Interurban	Trailer	Double	Two	42—6	48	25.00	4
Chicago & West Towns	4	Passenger	Interurban	Motor	Double	Two				
Chicago Elevated R.R.	2	Flat	City	Trailer	Double	One				
Ster. Dixon & East. El. Ry.	1	Fire	City	Trailer	Double	One	33—0	34	15.00	2
E. St. Louis & Sub. Ry.	7	Passenger	City	Motor	Single	One				
Chicago North Shore & Milwaukee R.R.	2	Passenger	City	Motor	Double	One	49—2	50	26.00	4
Chicago & Joliet E. Ry.	4	Passenger	City	Motor	Double	One	44—0	42	19.00	2
Rockford & Inter Ry.	4	Passenger	City	Motor	Double	One	41—4	40	18.00	2
Illinois Power Co.	7	Passenger	City	Motor	Double	One	41—4	40	18.00	2
Indiana										
Indiana Service Corp.	10	Passenger	City	Motor	Double	One	42—0	48	17.00	4
Gary Street Ry.	5	Passenger	City	Motor	Double	One				
Terre Haute, Indianap- olis & Eastern Tr. Co.	1	Freight	Interurban	Motor						
	2	Stock	Interurban	Motor						
	5	Box	Interurban	Motor						
Chicago, So. Bend & No. Indiana Ry.	18	Passenger	City	Motor	Double	One	41—8	42	16.00	2
	7	Passenger	City	Motor	Double	One	43—6	42	18.00	2
Maryland										
Hagerstown & Fred'ick Ry.	4	Passenger	Interurban	Motor	Double	Two	44—0	48	20.00	4
Michigan										
Grand Rapids Ry.	28	Passenger	City	Motor	Double	One				
New Jersey										
Burlington Co. Trans. Co.	1	Passenger	Interurban	Motor	Double	Two				
Pennsylvania R.R. System	2	Passenger	Interurban	Motor	Double	Train	54—41	72	45.00	
Trenton & Mercer County Tr. Corp.	20	Passenger	City	Motor						
New York										
International Ry.	100	Passenger	City	Motor	Double	One			30.00	
Second Ave. R.R.	10	Passenger	City	Motor	Double	One				2
Olean, Bradford & Sol. Ry.	70	Passenger	City	Motor	Single	One	27—0	20		2
New York State Rys.	15	Passenger	City	Motor	Double	One				
Schenectady Ry.	8	Passenger	City	Motor	Double	One				4
Black River Traction Co.	3	Passenger	Interurban	Motor	Double	Two				4
New York & Long Island Traction Co.	12	Passenger	Interurban	Motor	Single	One	32—0	30	9.00	2
Ohio										
Cincinnati Traction Co.	9	Passenger	City	Motor	Double	Two	38—9	35	19.41	4
Columbus, Delaware & Marion El. Co.	1	Passenger	Interurban	Motor	Double	Two				
Ohio Public Service Co.	1	Work	Interurban	Motor	Double	One	36—0		15.00	4
Columbus, Marion & Bucyrus Ry.	1	Work	Interurban	Motor	Double	One				
Indiana, Columbus & Eastern Tr. Co.	1	Freight	Interurban	Motor	Double	Two	60—0		40.00	4
Community Traction Co.	10	Passenger	City	Motor	Double	One	39—3	40	17.00	2
Penn.-Ohio Electric Co.	7	Passenger	City	Motor	Double	One				
Youngstown Munic. Ry.	12	Passenger	City	Motor	Double	One				
Peoples Rwy.	10	Passenger	City	Motor	Single	One				
N.E. Ohio Ry. & Pwr. Co.	1	Passenger	Interurban	Trailer	Double	One	46—10		16.00	
Pennsylvania										
North Branch Trans. Co.	6	Passenger	Interurban	Motor		One	27—7	33	9.00	2
New Jersey Interurban Co.	5	Passenger	Interurban	Motor		One	42—0	40		2
Buffalo & Lake Erie Tr. Co.	20	Passenger	City	Motor	Double	Two	43—0	42	23.00	4
Scrnykill Ry.	1	Passenger	Interurban	Motor	Double	Either	43—6	42	20.00	4
Citizens Traction Co.	2	Passenger	Interurban	Motor	Double	One				
Pittsburg Rws.	9	Work	City	Motor	Single	One				
Scranton Ry.	8	Passenger	City	Motor	Double	Two		40		4
West Chester Street Ry.	4	Passenger	Interurban	Motor	Double	Two	40—0	40	15.00	4
Phila. Rapid Transit Co.	40	Passenger	City	Motor	Double	One	45—6	51	18.00	2
Altoona & Logan Valley El. Ry.	10	Passenger	Interurban	Motor	Double	One	41—4	44	19.00	2

sit cars. The Long Island Railroad ordered 140 motor cars, the Interborough Rapid Transit Company 100 motor cars, the New York Rapid Transit Corporation fifty trailers, the New York Central Railroad thirty motor cars, the Hudson & Manhattan Railroad twenty-five motor cars and the Chicago Elevated five motor cars.

An exceptionally large number of cars were junked during the year, the number reported being 1,689, divided as follows: 1,085 city motor cars, 184 city trailers, thirteen open cars, fourteen interurban motor cars, two interurban trailers, 67 interurban ex-

TABLE IV—ELECTRIC LOCOMOTIVES ORDERED DURING 1923

Name of Railway	Num- ber	Weight Tons	Length Over All Ft. In.
New England District			
Boston Elevated Ry.	1	...	...
New York, New Haven & Hartford R.R.	12	181	68—6
North of the Ohio and East of the Mississippi River			
Baltimore & Ohio R.R.	2	120	39—6
Chicago, North Shore & Mil- waukee Ry.	1	50	37—4
Detroit & Ironton R.R.	2	180	...
Interstate Public Service Co.	1	50	35—6
Niagara Junction Ry.	2	43	32—7½
Pennsylvania R.R.	3	200	68—2½
Northwestern Ohio Ry. & Pwr. Co.	1	40	41—0
South of the Ohio and East of the Mississippi River			
Norfolk & Western R.R.	8	200	48—7
Virginian Ry.	36	200	48—7
West of the Mississippi River			
Denver & Intermountain R.R.	4	30	37—0
Glendale & Montrose Ry.	1	50	35—6
Iowa Southern Utilities Co.	1	50	35—6
Northeast Oklahoma R.R.	1	30	35—6
Pacific Electric Ry.	2	43	35—6
Petaluma & Santa Rosa R.R.	8	65	32—0
Portland Ry., Lt. & Pwr. Co.	1	45	30—6
Sacramento Northern R.R.	1	50	37—4
San Francisco, Napa & Calistoga Ry.	2	60	37—4
Oklahoma Union Ry.	1	50	50—0
	1	50	41—0
Total	92		

press and freight cars, one interurban service car, 18 city service cars, and 305 of which no designation was given.

The number of companies that reported new rolling stock ordered during 1923 is 167, compared with 145 for 1922 and ninety-four for 1921. These railways are approximately 18 per cent of all those in the United States and Canada.

In order to show the progress of rolling stock purchased by the railway industry at a glance, the comparative amount of new rolling stock ordered since 1907 is given in a separate table. This divides the cars into four classes: Passenger cars, city or interurban, freight, express and miscellaneous cars, and electric

locomotives. The miscellaneous cars include service cars, snow plows, sweepers, work cars, etc. A chart is also given showing the number of cars ordered since 1916. This divides the number of cars purchased into those for interurban service and city service.

A special comparison of cars ordered during the last eight years is given in Table II. Separate tabulations are given for cars in city service and those for interurban service. Referring to this table, it is interesting to note how the number of safety cars purchased increases each year from 1916 up to and including 1920, and during the same period how the number of large two-man cars shows a gradual increase. A comparison by percentage that the number of safety cars purchased is of the total number of motor passenger cars purchased for city service shows that the highest percentage for safety cars was reached in 1919, and since that time there has been a gradual return to the use of larger cars.

Details of the rolling stock ordered by individual companies are shown in Table III. The railways in each state are grouped and the various states arranged into four districts, in a manner similar to that followed in previous years. Canadian companies are listed separately. The only details of construction given are type, over-all length, weight and number of motors. The service for which the cars are purchased is also given. The district north of the Ohio and east of the Mississippi River purchased 2,203 cars and locomotives, which is 54 per cent of the total rolling stock that was ordered.

Compared with last year, the New England district shows a decrease in the number of cars and locomotives ordered of 33.2 per cent. The territory north of the Ohio and east of the Mississippi River shows an increase of 36.4 per cent. The district south of the Ohio and east of the Mississippi River has an increase of 6.7 per cent. The territory west of the Mississippi River shows an increase of 14.8 per cent, and the Dominion of Canada shows a decrease of 32.3 per cent. A recapitulation of the total for cars and electric locomotives ordered during 1923 is given in Table VI, which gives the various types of cars and the respective numbers ordered by each of the districts.

The railways which purchased electric locomotives during 1923 are given in Table IV. The total number

Table V (Continued)—Cars Rebuilt During 1923
South of the Ohio and East of the Mississippi River

Railway	Number	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Ft. Length Over All	In.	Seating Capacity	Total Weight Light (tons)	Number of Motors
Wisconsin											
Wisconsin Pub. Serv. Corp.	4	Passenger	Interurban	Motor	Double	One	42—0	40	17.50	2	
Milwaukee El. Ry. & Lt. Co.	58	Passenger	City	Motor	3 Truck	Two	89—1	93	37.50	4	
E. Wisconsin El. Co.	1	Passenger	City	Motor	Single	One	28—0	24	9.00	2	
Wisconsin Rapids St. R.R.	1	Plow	City	Motor	.....	.....	.....	.....	.....	.....	.....
Milwaukee Northern.....	10	Passenger	City	Motor	.....	One	.....	.....	.....	.....	.....
	2	Parlor	Interurban	Motor	.....	Two	.....	.....	.....	.....	.....
Total North of the Ohio and East of the Mississippi River.....	607										
Alabama											
Birmingham Ry., Lt. & Pwr. Co.	10	Passenger	City	Motor	Double	Two	40—6	52	13.00	4	
Mobile Lt. & Ry. Co.	3	Passenger	City	Motor	Single	One	32—0	28	12.50	2	
Alabama Power Co.	2	Passenger	City	Motor	.....	.....	.....	.....	.....	.....	.....
Florida											
Jacksonville Traction Co.	4	Passenger	City	Motor	Double	One	42—0	44	17.00	2	
Georgia											
Savannah El. & Pwr. Co.	6	Passenger	City	Motor	Double	Two	.....	42	.....	2	
Augusta-Aiken Ry. & El. Corp.	3	Passenger	Interurban	Motor	Double	Two	.....	52	.....	4	
	7	Passenger	City	Motor	Double	One	.....	40	.....	2	
Kentucky											
Kentucky Trac. & Ter. Co.	1	Passenger	City	Motor	.....	.....	.....	.....	.....	.....	.....
Louisville Ry.	6	Passenger	City	Motor	Double	Two	42—0	40	17.00	2	
	2	Passenger	City	Motor	Double	Two	45—0	41	22.50	4	
North Carolina											
Durham Pub. Service Co.	1	Passenger	City	Motor	.....	.....	.....	.....	.....	.....	.....
South Carolina											
Charleston Consolidated Ry. & Lt. Co.	10	Passenger	City	Motor	.....	One	.....	.....	.....	.....	.....
Tennessee											
Jackson Ry. & Lt. Co.	4	Passenger	City	Motor	.....	.....	.....	.....	.....	.....	.....
Virginia											
Rosnoke Ry. & El. Co.	3	Passenger	City	Motor	Single	One	28—0	28	.....	2	
West Virginia											
Monongahela Pr. & Ry. Co.	8	Passenger	City	Motor	Double	One	40—0	40	16.00	4	
Total South of the Ohio and East of the Mississippi River.....	70										

West of the Mississippi River

Arkansas											
Southwestern Gas & El. Co.	1	Passenger	City	Motor	Double	One	28—0	40	20.00	2	
California											
San Francisco, Napa & Calistoga Ry.	1	Passenger	City	Motor	.....	.....	.....	.....	.....	.....	.....
San Francisco, Oakland Terminal Rwy.	1	Passenger	City	Motor	Double	One	34—14	40	.....	2	
San Diego Electric Ry.	3	Passenger	City	Motor	.....	.....	.....	.....	.....	.....	.....
Southern Pacific Ry.	1	Passenger	Interurban	Motor	Double	Two	.....	.....	.....	.....	.....
Pacific Electric Ry.	1	Express	Interurban	Motor	.....	.....	.....	.....	.....	.....	.....
	2	Tower	Interurban	Motor	.....	.....	.....	.....	.....	.....	.....
Pacific Gas & Electric.....	4	Passenger	City	Motor	Double	Either	42—0	44	19.50	2	
Colorado											
Public Service Co. of Colo.	1	Flat	City	Motor	Double	.....	.....	.....	.....	.....	.....
Denver Tramway Co.	10	Passenger	City	Trailer	Double	.....	40—0	54	8.77	.....	.....
Iowa											
Iowa South. Utilities Co.	2	Passenger	City	Motor	.....	.....	.....	28	.....	2	
Dubuque Electric Co.	11	Passenger	City	Motor	Single	One	26—0	32	.....	2	
Mississippi Valley El. Co.	1	Passenger	City	Motor	Single	One	30—0	33	14.00	2	
	8	Passenger	City	Motor	Double	One	38—0	40	17.00	2	
Sioux City Service Co.	4	Passenger	City	Motor	Single	One	30—0	33	14.00	2	
	9	Passenger	City	Motor	Double	One	33—0	37	15.00	2	
Kansas											
United Traction Co.	9	Passenger	Interurban	Motor	.....	.....	.....	.....	.....	.....	.....
	1	Box	Interurban	Motor	.....	.....	.....	.....	.....	.....	.....
Minnesota											
Twin City Rapid Tran. Co.	75	Passenger	City	Motor	Double	Two	46—10	48	.....	.....	.....
Missouri											
Kansas City Clay Co. & St. Joseph Ry.	6	Gondola	Interurban	Trailer	Double	.....	.....	.....	.....	.....	.....
Kansas City Rys.	24	Passenger	City	Motor	Double	Either	.....	.....	.....	.....	.....
United Rws. of St. Louis.	107	Passenger	City	Motor	Double	Two	45—8	57	24.40	4	
Montana											
Anaconda Copper Min. Co.	2	Work	City	Motor	Double	.....	.....	.....	.....	.....	.....
Butte Electric Ry.	12	Passenger	City	Motor	.....	One	.....	.....	.....	.....	.....

Table V (Concluded)—Cars Rebuilt During 1923

West of the Mississippi River (Continued)

Railway	Number	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Over All Ft. In.	Seating Capacity	Total Weight Light (tons)	Number of Motors
Oklahoma										
Chickasha Street Ry.	1	Passenger	City	Motor	.....	One	.....	.....	.....	.....
Northeast Oklahoma R.R.	1	Line	Interurban	Motor	.....	Two	40—0	60	9.00	2
Muskogee Elec. Trac. Co.	3	Passenger	Interurban	Motor	Double	Two	30—0	54	8.00	2
Shawnee-Tecumseh Tr. Co.	2	Passenger	City	Motor	Single	One	.....	.....	.....	.....
Texas										
El Paso Electric Ry.	5	Passenger	City	Motor	Double	Either	43—0	44	20.00	4
Northern Texas Tract. Co.	22	Passenger	City	Motor	Double	One	40—6	40	18.00	4
Marshall Traction Co.	1	Passenger	City	Motor	Single	One	28—0	32	8.50	2
Galveston Electric Co.	10	Passenger	City	Motor	Single	One	32—0	34	15.00	2
Utah										
Salt Lake & Utah R.R.	3	Box	Interurban	Motor	.....	.....	.....	.....	.....	.....
	1	Tank	Interurban	Motor	.....	.....	.....	.....	.....	.....
	1	Flat	Interurban	Motor	.....	.....	.....	.....	.....	.....
Washington										
Pacific Northwest Tr. Co.	1	Combination	Interurban	Motor	Double	Two	59—0	57	39.00	4
Seattle Municipal St. Ry.	42	Passenger	City	Motor	Double	One	40—0	44	23.57	4
Spokane United Rlys.	4	Passenger	City	Motor	.....	One	.....	.....	.....	.....
Total West of the Mississippi River	393									

Dominion of Canada

Ontario										
Chatham, Wallaceburg & Lake Erie Ry.	7	Gondola	Interurban	Motor	Double	.....	34—6	.....	.....	.....
Fort William Elec. Ry.	2	Passenger	City	Motor	Single	One	.....	.....	.....	.....
	1	Passenger	City	Motor	Double	One	.....	.....	.....	.....
	90	Passenger	City	Motor	Double	Two	44—6	.....	.....	.....
Toronto Transportation Comm.	13	Passenger	City	Motor	Double	Either	47—0	.....	.....	.....
	1	Passenger	City	Motor	Double	Two	44—8	.....	.....	.....
	1	Passenger	City	Trailer	Double	.....	44—4	.....	.....	.....
Quebec										
Hull Electric Co.	1	Passenger	City	Motor	Single	One	30—0	36	5.50	1
Montreal & So. Co. Ry.	1	Passenger	City	Motor	Double	One	43—0	44	18.00	2
Quebec Ry. Lt. & Pwr. Co.	10	Milk	Interurban	Motor	.....	.....	.....	.....	.....	.....
	1	Passenger	City	Motor	Double	Two	40—0	36	11.00	2
Saskatchewan										
Moose Jaw El. Ry. Co., Ltd.	6	Passenger	City	Motor	.....	.....	.....	.....	.....	.....
Total for Canada	134									

of new electric locomotives is ninety-two, which is the largest since 1915, when these data were first compiled by the ELECTRIC RAILWAY JOURNAL.

Tables V and VII contain information in regard to cars reconstructed during the year 1923. One hundred and eleven railways reported the reconstruction of 1,226 cars. There were 565 cars reconstructed for one-man operation in city service and twenty-six for interurban service. A total of seventy-seven cars were reconstructed for one-man two-man operation.

The information given in the various tables of rolling stock was obtained from replies received to questionnaires sent to all the electric railways in the United States and Canada. It is quite impossible to receive replies from all railways when a definite time of publication must be met, but this year replies were received from more than 90 per cent of all the railways. The information thus obtained has been added to by items previously published and by a very complete list furnished by the car builders. These lists from the manufacturers have enabled us to check very carefully the figures obtained from the various railways, and in some cases, where replies were not received from the operating companies, the information furnished by the car manufacturers has been used in the tables.

TABLE VI—RECAPITULATION BY DISTRICTS OF CARS ORDERED DURING 1923

	New England District	North of the Ohio and East of the Mississippi River	South of the Ohio and East of the Mississippi River	West of the Mississippi River	Total for United States	Total for Canada	Grand Total
Number of companies reporting	15	80	24	35	154	13	167
City Service							
One-man cars, 28 ft. body	2	95	124	83	304	8	312
One-man cars other than 28 ft.	.....	.....	.....	.....	.....	.....	.....
{ Single truck	1	36	.....	5	42	13	55
{ Double truck	.....	64	29	35	128	.....	128
One-man two-man cars	266	608	55	135	1,064	12	1,076
Two-man cars (surface)	21	515	45	322	903	64	967
Motor cars for rapid transit trains	.....	130	.....	.....	130	.....	130
Trailers	.....	157	25	.....	182	65	247
Service and miscellaneous cars	7	78	15	14	114	7	121
Total cars city service	297	1,683	293	594	2,867	169	3,036
Interurban Service							
One-man double-truck cars	.....	54	2	.....	56	.....	56
One-man two-man cars	11	24	3	.....	38	.....	38
Two-man cars	.....	88	2	65	155	5	160
Trailers	.....	3	.....	.....	3	.....	3
Motor cars for train service	.....	170	.....	.....	170	.....	170
Express and freight cars	.....	149	8	293	450	1	451
Miscellaneous cars	2	20	.....	1	23	.....	23
Total cars, interurban service	13	508	15	359	895	6	901
Electric locomotives	13	12	44	23	92	.....	92
Total cars and electric locomotives	323	2,203	352	976	3,854	175	4,029

TABLE VII—RECAPITULATION BY DISTRICTS OF CARS REMODELED DURING 1923

	New England District	North of the Ohio and East of the Mississippi River	South of the Ohio and East of the Mississippi River	West of the Mississippi River	Total for United States	Total for Canada	Grand Total
Number of companies reporting	8	50	13	32	103	7	110
City Service							
Number remodeled for one-man operation	4	380	37	129	550	5	555
Number remodeled for one-man two-man operation	10	19	.....	33	62	13	75
Number remodeled for two-man operation	.....	89	24	182	295	101	396
Number passenger cars remodeled, no type given	13	32	6	16	67	7	74
Number of service and miscellaneous cars remodeled	25	13	.....	3	41	.....	41
Total remodeled cars city service	52	533	67	363	1,015	126	1,141
Interurban Service							
Number remodeled for one-man operation	.....	26	.....	.....	26	.....	26
Number remodeled for one-man two-man operation	.....	2	.....	.....	2	.....	2
Number remodeled for two-man operation	.....	30	3	4	37	.....	37
Number passenger cars remodeled, no type given	.....	1	.....	9	10	.....	10
Express, freight and miscellaneous cars remodeled	.....	15	.....	17	32	8	40
Total remodeled cars for interurban service	.....	74	3	30	107	8	115
Total city and interurban cars remodeled	52	607	70	393	1,122	134	1,256

Track Extensions and Reconstruction Greatest in Eight Years

Electric Railway Track Forces Have Been Busy with Reconstruction and More Miles of Track Were Rebuilt During the Past Year than Ever Before—The Amount of New Track Built Shows 36-Mile Gain Over 1922 and 100 Miles Over 1921

THE outstanding feature brought out by the track statistics for 1923 is the large amount of track which was rebuilt. The amount of new track built during the past year by electric railways is slightly greater than for 1922 and consists of 259.31 miles. This is made up of 169.61 miles for city lines, 63.54 miles for interurban lines and 26.16 miles of electrified steam lines. The greatest amount of extensions reported by any electric railway was 14.2 miles of new city track by the Twin City Rapid Transit Company, Minneapolis, Minn. Of this 11.7 miles were open construction and 2.5 miles in paved streets. The city of Detroit added 8.57 miles in paved streets and 1.66 miles of open construction, making a total of 10.23 miles. Some of the other large extensions for city service reported were the Toronto Transportation Commission, 7.15 miles; the Northern Texas Traction Company, 6.65 miles; the Cleveland Railway, 6.04 miles, and the Dal-

lashed. A total of 241 companies reported reconstruction of their tracks. This mileage for reconstructed track is the largest reported since the ELECTRIC RAILWAY JOURNAL has been compiling these data and exceeds last year's high record by 114.93 miles.

The accompanying tables, prepared from information received from 90 per cent of all electric railways in the United States and Canada, give a comparison of track construction by years since 1907 and also individual single track mileage built and rebuilt by the urban and interurban railways during 1923. This main table has the various companies grouped by states, and these in turn are geographically arranged into five districts, as has been the practice for several years past.

COMPARISON OF TRACK CONSTRUCTION

Year	No. of Companies	Urban Track	Extensions Interurban Track	Electrified Steam Lines	Total	Track Rebuilt
1907	(a)	(a)	(a)		1,880.00	(a)
1908	157		1,174.5	84.00	1,258.50	(a)
1909	160		774.7	112.40	887.16	(a)
1910	217		1,204.8	192.40	1,397.20	(a)
1911	223		1,105.0	86.50	1,191.50	(a)
1912	171		869.4	80.80	950.20	(a)
1913	181		974.9	119.00	1,093.90	(a)
1914	163		716.5	229.00	946.40	(a)
1915	136		596.0	448.20	1,044.20	(a)
1916	104	115.40	240.90	388.00	744.30	(a)
1917	121	251.10	125.60	66.00	442.70	375.40
1918	80	216.41	97.41	275.70	589.53	155.43
1919	73	110.90	29.67	287.60	428.17	390.64
1920	87	145.69	30.87	8.92	185.48	361.77
1921	78	108.15	38.95	8.08	155.18	615.21
1922	104	126.27	85.11	12.35	223.73	739.70
1923	272	169.61	63.54	26.16	259.31	854.63

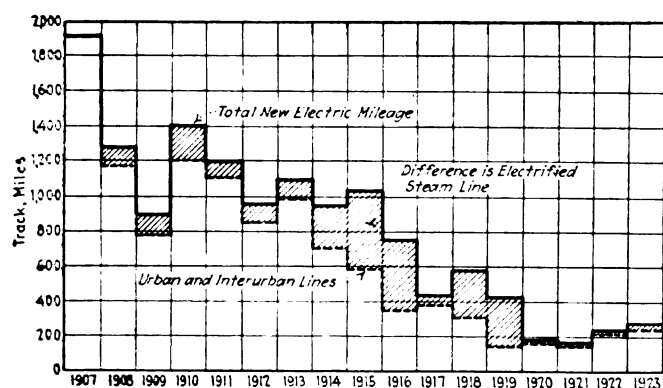
(a) Not available.

SUMMARY OF TRACK CONSTRUCTION FOR 1923

	New England District	North of the Ohio and East of the Mississippi River	South of the Ohio and East of the Mississippi River	West of the Mississippi River	Total for United States	Canada	Grand Total
Track Extensions							
Number of companies...	9	52	13	44	118	14	132
Miles of track constructed							
Urban.....	10.09	61.75	13.48	49.37	134.69	34.92	169.61
Interurban.....	4.91	18.04	0.72	33.56	57.23	6.31	63.54
Total track extensions	15.00	79.79	14.20	82.93	191.92	41.23	233.15
Track Reconstructed							
Number of companies...	24	105	31	62	222	19	241
Miles of track reconstructed							
Urban.....	73.43	267.04	60.60	120.41	521.48	38.29	559.77
Interurban.....	33.27	176.61	3.70	76.89	290.47	4.39	294.86
Total track rebuilt	106.70	443.65	64.30	197.30	811.95	42.68	854.63

ELECTRIFIED STEAM LINES

	Extensions, Miles
Chicago, Milwaukee & St. Paul Ry.....	0.334
New York Central R.R.....	0.425
Niagara Junction Ry.....	0.950
Northeast Oklahoma R.R.....	12.864
British Columbia Electric Ry.....	6.180
Glendale and Montrose Ry.....	3.500
New York, New Haven and Hartford R.R.....	
Total	26.163



Miles of Track Built, by Years, Since 1917

las Railway, 5.68 miles. The longest extension reported for interurban service was 6.36 miles over private right of way by the Columbus, Delaware & Marion Electric Company.

Compared with previous years, the mileage reported for track extensions during 1923 is 36 miles greater than for 1922. It is 104 miles greater than that reported for 1921. The accompanying graph gives a comparison of the miles of track built each year since 1907. The lowest point for urban and interurban track extensions was in 1919, with but 140.57 miles. There were 287.60 miles of steam lines electrified that year, however, which brought the total electric extensions up to 428.17 miles.

Electrification of steam lines, represented by the shaded area in the graph, in 1923 was 26.16 miles, which is the highest since 1919, but is still very small when compared with the 448 miles for 1915.

Track forces have been very busy, as is evidenced from the fact that 854.63 miles of track were recon-

Track Built and Rebuilt During 1923

New England District					Extensions, Miles		Rebuilt, Miles	
Railway	City	Interurban	City	Interurban	City	Interurban	City	Interurban
Connecticut								
The Bristol & Plainville Elec. Co.	1.56	0.18	0.50	2.19				
The Connecticut Co.			17.89					
Maine								
Fairfield & Shawmut Ry.			0.25	0.25				
Bangor Ry. & Elec. Co.			0.46	0.54				
Cumberland County Pwr. & Lt. Co.			1.45	0.48				
York Utilities Co.		2.10						
Biddeford & Saco R.R.			0.32					
Massachusetts								
Eastern Mass. St. Ry.	0.34	0.54	13.37	8.35				
Boston Elevated Ry.	3.38		18.12					
Boston & Worcester St. Ry.			1.08					
Connecticut Valley St. Ry.			1.19	0.15				
Mass. Northeastern St. Ry.			1.60	6.80				
Nahant & Lynn St. Ry.			1.60	2.00				
Milford & Uxbridge St. Ry.			0.99	0.11				
Berkshire St. Ry.			1.00					
Plymouth & Brackton St. Ry.			3.36	4.30				
Springfield St. Ry.	1.88	2.09	2.30	4.70				
Worcester Cons. St. Ry.	0.29		2.53					
Holyoke St. Ry.	0.33		1.51	3.40				
Union St. Ry.	0.08		1.27					
Middlesex & Boston St. Ry.								
Northampton St. Ry.								
New Hampshire								
Berlin St. Ry.			0.10					
Rhode Island								
United Elec. Rys.	2.23		3.14					
Vermont								
Burlington Trac. Co.			1.00					
Total	10.09	4.91	73.43	33.27				
North of the Ohio and East of the Mississippi River								
District of Columbia								
The Capital Trac. Co.	0.87		2.61					
Washington Ry. & Elec. Co.			6.50					
Illinois								
Aurora, Elgin & Chicago R.R.			3.00	4.50				
Chicago Surface Lines	2.37		9.75					
Southern Illinois Ry. & Pwr. Co.			0.42					
Chicago & Joliet Elec. Ry.			1.14					
Central Illinois Public Service Co.	0.11		0.83					
Peoria Ry. Terminal Co.			0.87	1.12				
Rockford & Interurban Ry.			0.83	0.33				
Chicago & Interurban Trac. Co.	0.42			40.00				
Chicago & West Town Ry.			7.48	1.00				
Metropolitan West Side Elev. Ry.	1.51							
Chicago, North Shore & Milwaukee R.R.		1.13	0.72	0.78				
East St. Louis & Sub. Ry.			4.07	1.84				
Illinois Power Co.			0.88					
Tri-City Ry.	0.51		1.50					
Indiana								
Union Trac. Co. of Indiana	0.98		0.55	1.27				
Southern Indiana Gas & Elec. Co.			1.66	0.34				
Indiana Service Corp.	2.15		2.05					
Terre Haute, Indianapolis & Eastern Trac. Co.		0.15						
Northern Indiana Power Co.			0.50	0.40				
Lafayette St. Ry., Inc.	0.28		0.16					
Chicago, South Bend & Northern Indiana Ry.	1.50		1.80					
Terre Haute Trac. & Light Co.			1.00	0.60				
Gary St. Ry.	1.50		0.75					
Maryland								
United Rys. & Elec. Co.			21.00					
The Potomac Edison Co.			0.58					
The Potomac Public Service Co.			0.70					
Michigan								
City of Detroit—Dept. of St. Rys.	10.23		4.12	5.00				
Lake Superior District Pwr. Co.			1.00					
Escanaba Pwr. & Trac. Co.			0.50					
Grand Rapids Ry.	1.16		2.10					
Detroit United Ry.	4.35	0.97	0.48					
Detroit, Jackson & Chicago Ry.		0.18	0.28					
Rapid Ry. System	0.06							
Detroit, Monroe & Tol. S. L.	0.04	0.43						
New Jersey								
The Morris County Trac. Co.		0.21	0.10					
Penna.-New Jersey Ry.			0.50					
Trenton & Mercer Co. Trac. Corp.	1.09		2.61	1.49				
Cumberland Traction Co.	0.10		3.40	8.00				
New York								
United Trac. Co.	1.06		6.00	0.25				
Auburn & Syracuse Elec. R.R.			0.71					
International Ry.	0.19	0.21	0.54	2.08				
Binghamton Ry.			0.95					
The Cortland County Trac. Co.				0.50				
Ocean Elec. Ry.	0.50		9.59					
The Brooklyn City R. R.			7.50					
Brooklyn-Manhattan Transit Corp.	0.59							
Interborough Rapid Transit Co.	3.09			1.00				
Southern N. Y. Pwr. & Ry. Corp.	0.06		0.33					
Hudson River & Eastern Trac. Co.								
Poughkeepsie & Wappingers Falls Ry.								
New York State Rys. (Rochester)	2.92						2.00	
Schenectady Ry.							8.42	
Syracuse & Eastern R.R.							0.52	0.15
Buffalo & Lackawanna Trac. Co.	0.09						0.38	
New Paltz, Highland & Poughkeepsie Trac. Co.							1.25	
Richmond R.R.							3.00	1.00
Empire State R.R. Corp.							7.30	
New York State Rys. (Syracuse)	0.72						1.69	
New York State Rys. (Utica)	1.04						2.90	0.45
Ohio								
Youngstown Municipal Ry.							0.83	
The Springfield & Xenia Ry. Co.							0.62	
Springfield Ry.							1.75	
Northwestern Ohio Ry. & Pwr. Co.							0.50	27.00
City of Ashtabula—Div. of St. Rys.							0.28	
Cincinnati, Georgetown & Portsmouth R.R.								1.00
The Cincinnati Trac. Co.	1.09						4.61	
The Cleveland Ry.	6.04						10.25	
The Cleveland, Southwestern & Columbus Ry.							7.50	
The Columbus, Delaware & Marion Elec. Co.		6.36					0.76	
The Columbus Ry., Pwr. & Lt. Co.	1.36						10.29	
Scioto Valley Trac. Co.							0.50	
The Dayton & Western Trac. Co.		1.41						
The Ohio Public Service Co.							0.50	
Indiana, Columbus & Eastern Trac. Co.								1.10
The Community Trac. Co.	0.64						2.69	
Cincinnati, Lawrenceburg & Aurora Elec. St. R.R.	0.80						0.95	
Peoples Ry.								
Pennsylvania								
The Lewistown & Reedsville Elec. Ry.		0.19						12.00
Shamokin & Mt. Carmel Transit Co.		2.55					0.41	
A. Lehigh Valley St. Ry.	0.64	0.09					35.35	2.74
Pittsburgh Rys.	0.08						3.55	
West Penn. Rys.	1.00	0.30					2.00	16.10
Reading Transit & Lt. Co.								
Philadelphia & West Chester Trac. Co.		0.51						7.50
West Chester St. Ry.							0.51	1.24
York Rys.							0.47	
Westmoreland County Ry.							0.51	2.39
Lehigh Valley Transit Co.	0.56						0.62	0.11
Altoona & Logan Valley Elec. Ry.	1.46	0.16					1.46	1.40
Conestoga Trac. Co.							2.23	
Beaver Valley Trac. Co.								9.00
North Branch Transit Co.							0.19	
Westside Elec. St. Ry.							0.25	
Philadelphia & Easton Transit Co.							1.00	
New Jersey Interurban Co.								0.62
Northampton Transit Co.							2.00	1.00
Buffalo & Lake Erie Trac. Co.								2.00
Northwestern El. Service Co. of Pa.							0.47	0.95
Schuylkill Ry.							3.61	
Harriburg Rys.							0.32	0.42
Indiana County St. Rys.							0.50	
The Irwin-Herminie Trac. Co.							19.49	1.70
Philadelphia Rapid Transit Co.	4.36						1.83	
Soranton Ry.								
Wisconsin								
Wisconsin Ry. Lt. & Pwr. Co.							2.42	
Madison Rys.	0.38						1.13	
The Milwaukee Elec. Ry. & Lt. Co.	3.85	1.42					8.98	4.94
Eastern Wisc. Elec. Co.							1.37	4.00
Wisconsin Valley Elec. Co.							0.42	
Lake Superior District Pwr. Co.							0.75	
Wisconsin Public Service Corp.							0.75	
Wisconsin Rapids St. Ry.							0.20	
Wisconsin Trac. Lt. Ht. & Pwr. Co.		0.19						
Total	61.75	18.04	267.04	176.61				
South of the Ohio and East of the Mississippi River								
Alabama								
Birmingham Ry., Lt. & Pwr. Co.	0.74						1.22	
Mobile Light & R.R. Co.							1.32	
Alabama Power Co.							1.30	
Florida								
Pensacola Elec. Co.							1.20	
Municipal Ry. of St. Petersburg	0.52						0.34	
Jacksonville Trac. Co.	1.57						0.13	
Miami Beach Elec. Co.	5.00							
Georgia								
Georgia Ry. & Pwr. Co.	2.80						8.70	
Rome Ry. & Lt. Co.							2.00	
Augusta-Aiken Ry. & Elec. Corp.							3.45	0.30
Kentucky								
Louisville Ry.	0.51	0.12					2.57	1.40
Paducah Elec. Co.							0.03	
Cincinnati, Newport & Covington Ry.							2.50	
Kentucky Trac. & Terminal Co.	0.41						1.96	
Mississippi								
Hattiesburg Trac. Co.							1.13	
Jackson Public Service Co.							5.00	
Laurel Lt. & Ry. Co.							1.00	

Track Built and Rebuilt During 1923—Concluded

Railway		Extensions, Miles		Rebuilt, Miles	
		City	Interurban	City	Interurban
North Carolina					
Durham Public Service Co.				0.40	
Tidewater Power Co.		0.60		2.00	
South Carolina					
Charleston Consol. Ry. & Ltg. Co.				0.75	
Tennessee					
Chattanooga Ry. & Lt. Co.	0.64			1.69	
Jackson Ry. & Lt. Co.				2.00	
Knoxville Pwr. & Lt. Co.	0.11			0.65	
Johnson City Traction Corp.				1.00	
Virginia					
Newport News & Hampton Ry., Gas & Elec. Co.				1.00	
Richmond-Ashland Ry.				2.00	
Radford Water Pwr. Co.				3.00	
Petersburg, Hopewell & City Pt. Ry.				2.00	
Virginia Ry. & Pwr. Co.	0.64			9.33	
West Virginia					
Monongahela Pwr. & Ry. Co.	0.17			0.73	
Princeton Pwr. Co.				1.63	
Charleston Interurban R.R.	0.38			0.57	
Total	13.48	0.72		60.60	3.70
West of the Mississippi River					
Arizona					
Tucson Rapid Transit Co.				1.23	
Arkansas					
The Pine Bluff Co.				0.75	
Southwestern Gas & Elec. Co.				0.04	
Arkansas Central Power Co.	0.22			3.16	
California					
San Francisco-Oakland Term. Rys.	1.16	0.26		6.11	
Petaluma & Santa Rosa R.R.		0.83			
San Diego Elec. Ry.	1.20			6.40	
San Francisco-Sacramento R.R.				0.60	6.96
Market St. Ry.				4.75	1.21
Municipal Ry. of San Francisco	1.86				
Southern Pacific Co.	0.02	0.07			
Santa Barbara & Sub. Ry.				0.40	
Pacific Gas and Electric Co.				1.96	
Visalia Electric R.R.		0.07		9.66	
Glendale & Montrose Ry.		0.60			
Pacific Electric Ry.		21.44		20.37	
San Diego & Arizona Ry.				0.19	
Colorado					
The Western Lt. & Pwr. Co.				1.73	
Colorado Springs & Interurban Ry.				1.00	
The Denver & Intermountain R.R.		0.49		11.80	
The Denver Tramway Co.	1.50			5.48	0.06
Southern Colorado Power Co.				2.00	
Idaho					
Boise St. Car Co.				0.48	
Iowa					
Cedar Rapids & Marion City Ry.				1.00	
Clinton, Davenport & Muscatine Ry.		0.24		0.10	0.19
Clinton St. Ry.				1.00	
Des Moines City Ry.	1.90	2.20		4.10	
Dubuque Elec. Co.				1.25	
Mississippi Valley Electric Co.	0.13			1.39	
Keokuk Electric Co.				1.28	
Waterloo, Cedar Falls & North. Ry.		0.06		0.33	0.22
Tri-City Ry. of Iowa	0.06			1.70	
Burlington Ry. & Lt. Co.				2.00	
Sioux City Service Co.	0.23			1.20	
Kansas					
The Hutchinson Interurban Ry.				1.00	
United Traction Co.	0.75			4.00	21.00
The Arkansas Valley Interurban Ry.		0.50			
Salina St. Ry.				0.50	
Louisiana					
New Orleans Public Service, Inc.	0.13			8.95	
Municipal St. Ry., Monroe				0.25	
Minnesota					
The Duluth St. Ry.	1.81			0.70	
Mankato Elec. Trac. Co.				0.70	
Twin City Rapid Transit Co.	14.20			3.00	
Wisconsin Ry., Lt. & Pwr. Co.				3.41	
Missouri					
Cape Girardeau-Jackson Int. Ry.				1.00	
Kansas City, Clay County & St. Joseph Ry.					0.60
The Kansas City Rys.				3.89	
Montana					
Helena Light & Ry. Co.	0.38			0.19	0.38
Butte Electric Ry. Co.	0.20				
Nebraska					
Omaha & Council Bluffs St. Ry. Co.				10.00	
North Dakota					
Northern States Pwr. Co.	0.28				
Oklahoma					
Oklahoma Union Ry.		0.68		0.33	
Northeast Oklahoma R.R.	0.48				
Oregon					
Portland Ry. Lt. & Pwr. Co.	0.48	0.56		3.41	1.48
Texas					
Texas Electric Ry.	0.71				
The Abilene Traction Co.	0.50			0.50	
Eastern Texas Elec. Co.	0.68			0.75	
Dallas Ry.	5.68			2.59	
El Paso Elec. Ry.	1.38			2.00	
Northern Texas Traction Co.	6.65			3.20	
Galveston & Houston Elec. Ry.		0.11			
Marshall Traction Co.				0.34	
Port Arthur Traction Co.				0.70	
San Antonio Public Service Co.	1.10			2.35	
Wichita Falls Traction Co.	2.50				
Galveston Electric Co.				1.00	
Austin Street Ry.	0.40				
Utah					
Utah Lt. & Trac. Co.				0.59	
Salt Lake & Utah R.R.		1.03			
Washington					
Lewiston-Clarkston Transit Co.				1.00	
Willapa Electric Co.	0.36				
Seattle Municipal St. Ry.	0.76			7.59	
Spokane United Rys.	1.28			4.53	
Walla Walla Valley Ry.		4.63			1.26
Yakima Valley Transportation Co.	0.56	0.05			
Pacific Northwest Traction Co.				1.51	
Wyoming					
Sheridan Ry. Co.				0.50	
Total	49.37	33.56		120.41	76.89
Canada					
British Columbia					
British Columbia Elec. Ry.	1.31			0.69	
Manitoba					
Winnipeg Electric Ry.	1.25			0.95	
New Brunswick					
New Brunswick Power Co.				2.36	
Nova Scotia					
N. S. Tramways & Pwr. Co., Ltd.				1.44	
Ontario					
Hydro Electric Rys.	3.59	1.31		1.98	
Cornwall St. Ry., Lt. & Pwr. Co.	0.50			1.00	
Fort William Electric Ry.	0.50	5.00			
Grand River Ry.					0.75
Dominion Pwr. & Trana. Co., Ltd.	1.00			1.02	
Kingston, Portsmouth & Cataraqui Elec. Ry. Co.				0.50	
The London St. Ry.				2.88	
Toronto Transp. Commission	7.15			7.77	
Kitchener & Waterloo St. Ry.	1.48				0.95
Ottawa Electric Ry.				4.00	
Quebec					
Sherbrooke Ry. & Power Co.				0.81	
Three Rivers Traction Co.	1.40				
Montreal Tramways Co.	4.00			9.35	
The Hull Electric Co.				0.42	2.69
Levis County Ry.				2.00	
Quebec Ry., Light & Pwr. Co.	0.28				
Saskatchewan					
Regina Municipal Ry.	0.38			0.12	
Saskatoon Municipal Ry.	0.08				
Moose Jaw Elec. Ry.	12.00			1.00	
Total	34.92	6.31		38.29	4.39

The State of Pennsylvania has the largest mileage for track rebuilt, with 25 railways reporting 76.77 miles of city track and 59.17 miles of interurban track reconstructed. Massachusetts, Illinois, New York and Ohio also report a large amount of rebuilt track. These five states also reconstructed 424.77 miles of track, which is 52 per cent of the total for the United States.

Data has been obtained for paved and open track. From this it appears that 58 per cent of the extensions to city tracks were in paved streets and 42 per cent had open construction. Of the interurban extensions

21 per cent had paved and 79 per cent open construction. For track rebuilt 91 per cent of that reported for city service was in paved streets and but 9 per cent had

	Paved	Open
City extensions	98.37	71.21
Interurban extensions	13.34	50.20
Reconstructed city tracks	509.39	50.38
Reconstructed interurban tracks	53.93	240.93

open construction. Mileage for reconstructed interurban tracks showed 17 per cent with paved and 83 per cent with open construction.

Orders for Automotive Equipment on the Increase

PURCHASES of motor buses by electric railways more than doubled during 1923 as compared with the preceding year, and there was also a healthy increase in the number of motor trucks ordered for various kinds of service work. These figures indicate clearly the growing tendency of the industry to appreciate the advantages of automotive equipment, both for passenger transportation and for auxiliary operation in connection with running and maintaining the railway systems.

The following table summarizes briefly the total orders placed for automotive equipment by electric railways in 1922 and 1923.

	Motor Buses Ordered	Trolley Buses Ordered	Gas Rail Cars Ordered	Service Trucks Ordered	Total
1923	621	15	4	148	797
1922	240	6	2	112	360
Increase	381	9	2	36	437

Further analysis of the tabulation of motor buses ordered shows that 69 individual companies placed orders in 1923 as compared with 28 in 1922.

Measured in terms of passenger capacity, a decided preference is shown by the railways for buses with seating accommodations for about 25 passengers. With only a few exceptions, the buses ordered are provided with over 20 seats. Double-deck buses, seating from 51 to 67 passengers, were ordered by three electric railways. There were thirty-one of these double-deck types ordered during the year.

Of the fifteen electrically driven trackless trolley buses ordered, five went to one company and ten to another.

As for the class of automotive equipment known as service trucks ordered during 1923, the 148 shown include tower trucks, dump cars, emergency wagons, trucks for handling freight and express, and miscellaneous trucking vehicles. There are also included in this figure, three gasoline-driven tractors, one snow loading machine, and one trailmobile.

Elsewhere in this issue there is given a complete summary of the motor bus equipment now owned and operated by the electric railway companies. The table here shows only buses ordered during the year just closed.

Not all of the buses ordered have been delivered and placed in actual operation at the present time.

Automotive Equipment Ordered During 1923

Company	No. of Vehicles	Class of Service	Type of Chassis	Body Builders	Capacity Seats (Buses)	Tons (Trucks)
Div. of St. Rys.—City of Ashtabula, Ohio.....	1	Motor Bus	Mack	Kuhlman	29	
Community Trac. Co. (Toledo, Ohio).....	1	Service Truck	Mack			2½
Youngstown (O.) Municipal Ry. Co.....	24	Service Truck	Ford			1
Pennsylvania-Ohio Elec. Co. (Youngstown, Ohio).....	7	Express Truck	Overland			½
No. Ohio Trac. Lt. Co. (Akron, O.).....	6	Motor Bus	White	Bender	25	
Youngstown (Ohio) & Suburban Ry. Co.....	2	Motor Bus	Garford	Co.'s Shop		1
Altoona & Logan Valley Elec. Ry. Co. (Altoona, Pa.).....	7	Motor Bus	White	Bender	18-25	
Schuylkill (Pa.) Ry. Co.....	1	Motor Bus	Garford	Bender	25	
Lewiston (Pa.) & Reedsville Elec. Ry. Co.....	6	Motor Bus	White	Kuhlman	25	
Citizens Trac. Co. (Oil City, Pa.).....	1	Motor Bus	White	Lang	18	
Philadelphia (Pa.) Rap. Tr. Co.....	4	Motor Bus	Maccar	Kuhlman	25	
Pittsburgh (Pa.) Rys. Co.....	2	Motor Bus	White	Kuhlman	17	
The West Chester (Pa.) St. Ry. Co.....	5	Motor Bus	Dodge-Graham		16	
York (Pa.) Rys. Co.....	3	Motor Bus	Garford		21	
United Elec. Rys. Co. (Providence, R. I.).....	2	Motor Bus	Reo	McKay	18	
Sioux Falls (So. Dakota) Trac. System.....	2	Motor Bus	Reo	McKay	20	
Knoxville (Tenn.) Power & Lt. Co.....	2	Motor Bus	Dodge-Graham		16	
Eastern Texas Elec. Co. (Beaumont, Tex.).....	1	Service Truck	White	White		2
San Antonio (Tex.) Public Service Co.....	9	Trolley Bus	Commercial	Trackless Trolley Corp.	27	
Twin State Gas & Elec. Co. (Brattleboro, Vt.).....	1	Trolley Bus	Brill	Brill	28	
Puget Sd. Int. Ry. & Power Co. (Everett, Wash.).....	10	Motor Bus	Yellow Coach	Yellow Coach	67	
Pacific Northwest Trac. Co. (Seattle, Wash.).....	16	Motor Bus	Phila. Motor Coach	Brill	64	
Seattle (Wash.) Municipal St. Ry.....	6	Service Truck	(a)			
Monongahela-W. Penn. Public Serv. Co. (Fairmont, W. Va.).....	3	Service Truck	Autocar			2-3
Princeton (W. Va.) Power Co.....	2	Motor Bus	White	Hoover	25	
Milwaukee (Wis.) Elec. Ry. & Lt. Co.....	1	Motor Bus	Reo	Hoover	20	
Eastern Wisconsin Elec. Co. (Oshkosh, Wis.).....	1	Service Truck	Pierce-Arrow	Hoover	25	
Winnipeg (Canada) Elec. Ry. Co.....	4	Motor Bus	White	Brown	25	
Nova Scotia Tramways & Power Co. (Halifax, N. S.).....	1	Motor Bus	5th Ave. Bus	5th Ave. Bus	25	
Hydro-Electric Rys. (Windsor, Ont.).....	6	Motor Bus	Mack	Mack	25	
Toronto Transp. Comm. (Toronto, Ont.).....	1	Dump Cars	Reo	Reo		1½
	1	Service Truck	White	White		2
	5	Motor Bus	White-50	Eckland	25	
	1	Service Truck	White	Co.'s Shop		2
	1	Motor Bus	White-50A	Bender	21	
	2	Motor Bus	Reo		12	
	1	Motor Bus	White		21	
	1	Motor Bus	Fageol		29	
	2	Motor Bus	White-50	Brown	25	
	1	Motor Bus	Stewart	Paterson	27	
	5	Motor Bus	Fageol	Fageol	29	
	4	Motor Bus	White	Co.'s Shop	25	
	2	Motor Bus	White	Co.'s Shop	19	
	3	Motor Bus	Fageol	Fageol	22	
	1	Service Truck	White	Co.'s Shop		2½
	2	Motor Bus	Garford	Garford	29	
	1	Motor Bus	Garford	Co.'s Shop	29	
	3	Motor Bus	Pierce-Arrow	Kuhlman	25	
	2	Motor Bus	White	Kuhlman	25	
	2	Motor Bus	Garford	Kuhlman	21	
	1	Motor Bus	Reo	Fitz-John	18	
	5	Motor Bus	White	Bender	19	
	1	Motor Bus	Fageol	Fageol	23	
	10	Motor Bus	5th Ave. Bus	5th Ave. Bus	51	
	9	Motor Bus	5th Ave. Bus	5th Ave. Bus	25	
	38	Service Truck	(b)			
	5	Motor Bus	White	Bender	22	
	2	Motor Bus	G. M. C.		24	
	2	Motor Bus	Ruggles		24	
	1	Motor Bus	Reo	Studebaker	15	
	1	Motor Bus	Reo	Can. Comm. Car.	15	
	4	Express Truck	Packard	Packard		3½
	1	Tower Truck	Gotfredson	Gotfredson		2½
	4	Motor Bus	5th Ave. Bus	5th Ave. Bus	29	

(a) Autocars, Whites, Fords, G. M. C.'s, Maccars. (b) Fords, Parkers, Reos, Whites, etc.

Automotive Equipment Ordered During 1923—(Continued)

Company	No. of Vehicles	Class of Service	Type of Chassis	Body Builders	Capacity	
					Seats (Buses)	Tons (Trucks)
Birmingham (Ala.) Ry. Lt. & Power Co.	4	Motor Bus	Reo	Fitz-John	12	
San Francisco-Oakland Term. Rys. (Cal.)	2	Motor Bus	Fageol	Fageol	29	
San Diego (Cal.) Elec. Ry. Co.	10	Motor Bus	Fageol	Fageol	29	
	1	Service Truck	White			
	1	Service Truck	Fageol			
	1	Service Truck	Dodge			
	1	Service Truck	Ford			
Pacific Gas & Elec. Co. (Sacramento, Cal.)	1	Motor Bus	White-50	Co.'s Shop	25	
Santa Barbara (Cal.) Sub. Ry.	3	Motor Bus	Moreland	Moreland	21	
Pacific Elec. Co. (Los Angeles, Cal.)	2	Motor Bus	Reo	Pacific Motor Body	17	
	10	Motor Bus	White	Motor Trans. Co.	25	
	53	Motor Bus	White	Co.'s Shop	25	
	21	Motor Bus	Moreland	Moreland	16	
	16	Motor Bus	Moreland	Moreland	25	
Los Angeles (Cal.) Motor Bus Co.	20	Motor Bus	Fageol	Fageol	29	
(subsidiary of Los Angeles Ry. Co.)	81	Motor Bus	White		25	
Denver (Colo.) Tramway Co.	1	Service Truck	Ford	Co.'s Shop		1
Shore Line Elec. Ry. Co. (Norwich, Conn.)	4	Motor Bus	Fageol	Fageol	29	
	1	Motor Bus	White	Brown	24	
	1	Service Truck	Pierce Arrow			1
New York, New Haven & Hartford R.R. Co. (New Haven, Conn.)	1	Rail Car		Osg. Bradley	60	
Capitol Trac. Co. (Wash., D. C.)	1	Motor Bus	Garford	Brown	25	
	2	Motor Bus	White	Bender	25	
	1	Motor Bus	Reo			
	4	Motor Bus	5th Ave. Bus	5th Ave. Bus	25	
	1	Service Truck	White			2
	2	Service Truck	Ford			1
Washington Ry. & Elec. Co. (Wash., D. C.)	8	Motor Bus	Graham Bros.	Hoover	20	
E. St. Louis & Sub. Ry. Co.	2	Motor Bus	White-50	Badger	25	
	1	Motor Bus	White-50	Kuhlman	25	
	1	Service Truck		Co.'s Shop		1
Chicago, No. Shore & Milwaukee R.R. Co. (Highwood, Ill.)	13	Motor Bus	White-50	Kastory	25	
	7	Motor Bus	Fageol	Fageol	22-29	
Peoria (Ill.) Ry. Co.	2	Motor Bus	White	Champion	26	
Rockford (Ill.) Interurban Ry. Co.	1	Service Truck	G.M.C.	G.M.C.		1
Indiana Service Corp. (Ft. Wayne, Ind.)	2	Service Truck	White			
	4	Service Truck	Ford			
Chicago, So. Bend (Ind.) & No. Ind. Ry. Co.	3	Motor Bus	White-50	Champion	25	
Tri City Ry. Co. (Rockford, Ill.)	2	Motor Bus	White-50	Kuhlman	25	
Des Moines (Ia.) City Ry. Co.	3	Motor Bus	White-50	Champion	25	
Dubuque (Ia.) Elec. Co.	3	Motor Bus	Dodge-Graham		18	
Mississippi Valley Elec. Co. (Iowa City, Ia.)	1	Motor Bus	Garford	Garford	25	
Waterloo (Ia.) Cedar Falls & No. Ry. Co.	2	Motor Bus	Mack		25	
Louisville (Ky.) Ry. Co.	12	Motor Bus	White-50	Bender	25	
	2	Dump Car	Ford	Lee		1
	1	Dump Car	White			5
	1	Trailer Flat	Trailmobile			5
	1	Service Truck	White	Co.'s Shop		2
	1	Tower Truck	White	Trenton Tower Co.		2
	1	Tower Truck	Ford	Schmidt		1
	1	Tractor	Fordson			
Potomac Edison Co. (Cumberland, Md.)	2	Motor Bus	White	Hoover	25	
Eastern Mass. St. Ry. Co. (Boston, Mass.)	17	Motor Bus	Stewart	Paterson	27	
	3	Motor Bus	White	Brown	25	
	3	Motor Bus	White	Brown	16	
Boston (Mass.) Elev. Ry. Co.	11	Motor Bus	Mack	Mack	25	
	20	Motor Bus	White	Brown	25	
	2	Tower Trucks	White	McCardle		2
	9	Service Truck	Ford	Ford		1
	4	Service Truck	White	White		2
	1	Service Truck	White	White		3
	1	Service Truck	White	White		5
	1	Service Truck	Mack			5
	2	Tractors	Fordson			
Holyoke (Mass.) St. Ry. Co.	1	Snow-Loader	Barber-Greene			
Middlesex & Boston St. Ry. Co. (Newton, Mass.)	1	Motor Bus	Mack	Mack	25	
New Bedford (Mass.) & Onset St. Ry.	10	Motor Bus	White	Bender	25	
Union St. Ry. Co. (New Bedford, Mass.)	1	Motor Bus	Reo	Boston Body Co.	21	
Plymouth (Mass.) & Brockton St. Ry. Co.	1	Motor Bus	Mack	Mack	25	
Springfield (Mass.) St. Ry. Co.	2	Motor Bus	Reo	Boston Body Co.	20	
	1	Motor Bus	Selden	Kuhlman	29	
	1	Motor Bus	White	Brown	25	
	1	Motor Bus	Stewart	Paterson	20	
	1	Motor Bus	Federal	Kuhlman	25	
	1	Service Truck	Federal			1
	1	Dump Car	Federal			5
Grand Rapids (Mich.) Ry. Co.	6	Motor Bus	5th Ave. Bus	5th Ave. Bus	29	
Saginaw (Mich.) Transit Co.	10	Motor Bus	White	Bender	25	
Twin City Rapid Tr. Co. (Minneapolis, Minn.)	15	Motor Bus	Reo	Fitz-John	21	
	2	Service Truck	Ford			1
	1	Service Truck	Mack			2
	1	Express Truck	White	Co.'s Shop		2
United Rys. Co. of St. Louis, Mo.	2	Tower Truck	White	Co.'s Shop		2
	2	Dump Car	White	White		2
	1	Dump Car	White	White		3
Cumberland Traction Co., Bridgeton, N. J.	2	Motor Bus	Reo		16	
Millville (N. J.) Traction Co.	1	Motor Bus	Ford	Co.'s Shop	18	
Public Service Ry. Co. (Newark, N. J.)	1	Motor Bus	Fageol			
	4	Motor Bus	Reo			
	1	Motor Bus	5th Ave. Bus	5th Ave. Bus	25	
	1	Motor Bus	5th Ave. Bus	5th Ave. Bus	51	
	20	Motor Bus	White		25	
Trenton (N. J.) & Mercer Co. Trac. Corp.	5	Motor Bus	White-50	Kuhlman	25	
	1	Service Truck	White-20			2
City Elec. Co. (Albuquerque, N. Mex.)	1	Motor Bus	White	White	15	
Cortland (N. Y.) County Trac. Co.	1	Service Truck	Ford	Ford		1
Pennsylvania R.R. Co. (Phila., Pa.)	1	Gasoline Rail Car	Steel Motor Service Co.	Brill	39	
	1	Gasoline Rail Car	Steel Motor Service Co.	Brill	43	
	1	Gasoline Rail Car	Steel Motor Service Co.	Brill	45	
New York & Long Island Trac. Co. (Hempstead, N. Y.)	1	Tower Truck	White	Trenton Tower		2
New York State Rys. Co. (Rochester, N. Y.)	5	Trolley Bus	Brockway	Kuhlman	25	
	7	Motor Bus	Brockway	Kuhlman	25	
	1	Service Truck	Reo			
	2	Service Truck	White			
	2	Service Truck	Ford			
New York State Rys. Co. (Syracuse, N. Y.)	1	Tower Truck	White			2
	1	Dump Car	White			3
	1	Dump Car	White	White		3
International Ry. Co. (Buffalo, N. Y.)	3	Motor Bus	White	White	25	
Schenectady (N. Y.) Ry. Co.	1	Emergency Truck	Reo	Co.'s Shop		

The Readers' Forum

Budd's Approach to Problems Different

CITY OF DETROIT
Department of Street Railways

Dec. 31, 1923.

To the Editors:

I want to congratulate you upon your handling of the interview with Britton I. Budd. I think it is the best piece of work I have seen in the *ELECTRIC RAILWAY JOURNAL* in a long time.

Would also say that from the writer's standpoint Mr. Budd's approach to the various problems of railway service is entirely different from that of any of the past executives of the association. He has a conception of public service which, in my mind, is a splendid contrast to some of the ideas of his predecessors.

ROSS SCHRAM,
Assistant General Manager.

Interview Full of Inspiration

BEAVER VALLEY TRACTION COMPANY
NEW BRIGHTON, PA., Dec. 27, 1923.

To the Editors:

I have enjoyed reading very greatly your interview with Britton I. Budd and his statements on "Modernize and Merchandise." I believe this article is full of inspiration, and while a good many have had some similar thoughts this article should stir them to action.

C. D. SMITH,
Superintendent.

Budd's Views Should Reach Public

RAILROAD COMMISSION OF WISCONSIN

MADISON, Dec. 29, 1923.

To the Editors:

I have read with a great deal of interest your interview with Britton I. Budd as published in your issue of Dec. 22, 1923. The electric railway industry is to be congratulated upon having at the head of its association a man of his capacity. No doubt the publication of his views will be of great benefit to those who give careful attention to that article.

But it is to be regretted that there seems to be no way by which the general public, and especially the city and municipal authorities, can be reached by such a message as that presented in this interview.

These people seldom or never see these technical journals, and even if they do see them they have a feeling that everything contained therein is prepared for the benefit of the industry and must, therefore, be opposed to the public interest.

In our capacity as a regulatory body our problems are very much the same as those of the utilities and we find it very hard to secure co-operation from the city authorities in matters directly affecting the public interest. This is no doubt due to a lack of knowledge of facts and to a suspicion that all suggestions made by utilities are prompted by a selfish desire to impose on the people.

I am sure that if such clear statements as are made by Mr. Budd could be given such publicity that they would reach the public from time to time, the result would be of benefit to the communities as well as to the utilities.

C. M. LARSON,
Engineer.

Association News and Discussions

Program for the Paris Convention

THE program for the nineteenth convention of the Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles has been made public. The meeting will be held in Paris in 1924. A list of the subjects follows:

1. "Engagement and Training of Transportation Employees." By Mr. Bacqueyrisse, general manager of transportation and technical service of the Société des Transports en Commun de la Région Parisienne, and Mr. Prins, engineer attached to the executive department of the Tramways Bruxellois.

2. "The Effect of Local Transportation Systems on the Growth of the Cities and the Suburbs Which They Serve." By Mr. Delavenne, member of the Municipal Council of Paris, president of the Transportation Commission, and chairman of the budget committee of the Council of the Seine Department.

3. "Recent Improvements in Track Construction and Special Trackwork." By Mr. Bouton, vice-president Cie. des Tramways de l'Est-Parisien; E. d'Hoop,

chief engineer Tramways Bruxellois; P. Lo Balbo, transportation manager Cie. Générale des Tramways à Vapeur Piémontais à Saluzzo; and J. Torres y Estrada, engineer maintenance of way, Barcelona Tramways.

4. "Recent Improvements in Rolling Stock, Particularly in Connection with the Reduction in First Cost, Maintenance, and Power Consumption, Divided as follows: (a) Body, Truck, Ball Bearings, Roller Bearings, Radial Trucks; (b) Reduction in Weight; (c) Electrical Equipment, Types of Motor, Regenerative Control, Controllers, Wiring, etc." By Mr. Ricaud, manager, Marseilles Tramways; Ch. Harmel, engineer-manager Tramways Est-Ouest de Liège, and H. Dubath, engineer Société Industrielle Suisse de Neuchâten.

5. "Gas Motor Cars for Rail Service." By P. Jourdain, manager Cie. des Chemins de Fer Secondaires du Nord-Est, Paris, and J. de Croes, chief engineer and director Société Nationale des Chemins de Fer Vicinaux of Belgium.

6. "Improvements in Steam Locomotives Adapted to Light Railway Work, Particularly from the Point of View of Fuel Economy, as by Superheating,

Economizers, etc." By Mr. Renard, associate manager Cie. Centrale de Chemins de Fer, Paris, and Mr. Van den Broek, engineer of the Holland State Railways, The Hague.

7. "Motor Design for Buses." By Mr. Bonhomme, manager Société de Transports Automobiles Industriels et Commerciaux, Paris.

Indiana Utility Men to Meet

THE Indiana Public Utility Association will hold its annual meeting at Purdue University, Lafayette, Ind. Plans are being made for the sessions to be held Jan. 15 and 16.

The first day's program will include an afternoon meeting devoted to business and addresses, and a banquet to be served by the home economics department of the university.

The program for Tuesday, the second day, will be in charge of Dean A. A. Potter of the College of Engineering and Professor C. F. Harding of the Electrical Engineering School. A study of the ways in which Purdue can serve the utility industry and methods by which the utility heads can co-operate better with the university in handling engineering problems will be the topics.

The News of the Industry

Governor Attacks State Regulation

Chief Executive of New York Laments Failure of Recommendation for Return to Home Rule

In his annual message to the Legislature, delivered on Jan. 2, Governor Smith of New York said that it was a matter of regret that at the last session no advance was made toward a removal of the obstacles standing in the way of the solution of the problem of the regulation of the public utilities of the State.

According to the Governor the present public service and the transit commission acts contain provisions that are utterly indefensible, and it is impossible to take from the public mind the idea that at least some of them were written into the statutes of the State in the interest of the utilities as against the public welfare. He said that it was indefensible to withdraw from the localities the power over their own contracts and lodge it in state commissions. According to him this power should be returned to the municipalities and they should be left free to deal for themselves with the corporations with which they made the original contracts.

MUNICIPALITY SHOULD BE AGENT OF STATE

In this connection the Governor went even a step farther and said that to his mind there was no reason why the state should not accept a municipality as its agent in the regulation of public utilities, particularly where the utility is entirely within a city. It is his idea that this does no violence to the theory of state regulation, because the municipality can act as the agent of the State just as well as could a commission appointed by the Governor. This would mean local control as to certain utilities.

On the other hand the Governor was quick to explain that this did not mean that municipalities should have forced upon them the power of control and regulation of their public utility corporations, because that would be an interference with the home-rule principle of the local community, but provision could be made that by vote of the common council, or, in the case of the city of New York, by its Board of Estimate and Apportionment, or for that matter, after a referendum to its people, petition could be made to the state to perform the regulatory service for the particular locality. It is the Governor's idea that where a city decides to carry on regulation it should be left free to determine its own agency, board, bureau or commission to perform that service. As to utilities that are

not confined to a single city or whose operations are state-wide, the Governor would have the state retain its power of control and regulation. To make this policy effective the Governor would abolish the present Public Service Commission and empower the state's chief executive to appoint not more than three commissioners to regulate such utilities as are not to be regulated by the cities.

According to Mr. Smith there is a special situation in New York City with regard to rapid transit construction which should long since have ceased to be controversial. He says that nobody can dispute the established fact that rapid transit construction in the city of New York is a purely municipal enterprise and that no sensible reason has ever been advanced why the State of New York should interfere in the construction of rapid transit lines that are wholly within the corporate limits of the city of New York and built with the city's own funds without financial aid or assistance from the state. In this connection he said:

Aside from any other argument there is no use for the Transit Commission. It merely duplicates what the city itself should be doing and creates an unnecessary agency that adds to the burden of the taxpayer and the rent payer. It should be abolished and full control over the construction of rapid transit railroads should be given to the local authorities.

The Governor wants the cities invested immediately with the power to own and operate any bus lines which in the opinion of local authority are required to meet the needs of the people. The Governor says that this introduces no new or untried principle in government, as New York City now owns railroads and owns and operates ferryboats. The carrying out of his recommendations would, according to the Governor, simply extend the principle to all forms of utilities and make it applicable to all cities.

Loyalty Draws a Dividend.—Appreciation of the loyalty of employees of the Bamberger Electric Railroad, Salt Lake City, has been recognized in the distribution of checks from the employees' service dividend fund, organized by former Governor Simon Bamberger, president of the road. The dividend is based on the last six months' salary of all employees who have been in the service of the company more than a year. The president of the company issued a letter in which he said he was pleased to be able to give recognition to the value of the long and efficient service of the employees, and in view of the reduction in accident costs and loss and damage expense for the past year, the dividend was announced.

Declared Not an Interstate Carrier

I. C. C. Holds Washington Company Is Not Subject to Its Rules as Regards Depreciation

A decision was handed down on Dec. 8 holding that the Washington Railway & Electric Company is not an interstate carrier under the meaning of the interstate commerce act and so not subject to the regulations of the Interstate Commerce Commission so far as they relate to rates and depreciation. This case has been before the Interstate Commerce Commission for nearly two years. The railway contended that it was subject to the provisions of the act, while the Public Utilities Commission of the District of Columbia argued to the contrary. The American Electric Railway Association and the National Association of Railway & Utility Commissioners participated in the oral arguments. Charles L. Henry represented the American Electric Railway Association.

OTHER SIMILAR CASES CITED

In its decision the commission describes the system of the company. This comprises about 131 miles of track within the District of Columbia and 33 miles in Maryland, of which 28 miles in Maryland and 15 within the District are on private right-of-way. Passengers are transported across the boundary line without change of cars. Of the total revenue of the system 99.3 per cent is from the transportation of passengers. Only 5.7 per cent of the total revenue is from transportation outside the District. In addition to its own service, the company has a trackage arrangement with the Washington, Baltimore & Annapolis Electric Railroad, under which the latter company transports interstate passengers, freight and express in its own cars over a part of the tracks of the Washington Railway & Electric Company into the District of Columbia.

In its decision the commission cites the case of the Omaha Street Railway vs. Interstate Commerce Commission, 230 U. S. 324, in which the Supreme Court held that an electric railway operating between Council Bluffs, Iowa, and Omaha, Neb., was a street railway and not subject to the act, pointing out that the latter was intended to cover railroads engaged in hauling passengers and freight as channels of interstate commerce, whereas street railways are primarily designed for local transportation. It also referred to the decision of the Supreme Court in Washington Railway & Electric Company vs. Scala, 242 U. S. 630, in which the company was

held to be a common carrier by railroad within the meaning of the employers' liability act, but the Interstate Commerce Commission declares that the decision of that case was under different statute, enacted for a different purpose and should not be considered as controlling in this case. The Supreme Court also distinguished it from the Omaha case, saying, in part:

That case dealt with a purely street railway in the streets of two cities, and the decision was that it was not a "railroad," such as was intended to be placed under the jurisdiction of the Interstate Commerce Commission by the interstate commerce act of 1887. The case is of negligible value in determining either the construction of the act we are considering in this case or the classification of the defendant, which clearly enough is a suburban railroad common carrier of passengers within the scope of the Federal employers' liability act.

In consequence, the commission declared that the Washington Railway & Electric Company, together with its subsidiary electric companies, is not a carrier subject to the act and that it had no jurisdiction over the depreciation charges of these companies.

Transit Commission and City Officials of New York Agree on Subway Routes

The plan to put the proposed West Side-Washington Heights subway, New York City, under the westerly edge of Central Park has been abandoned. Announcement to this effect was made on Jan. 1 by George McAneny, chairman of the New York Transit Commission. The commission has reached an agreement with the transit committee of the Board of Estimate to shift the route of the section between Fifty-ninth and 110th Streets one block west to Columbus Avenue and has sent a revised and final routing of the Washington Heights subway to the board.

With this agreement the commission announced that it was in full accord with the transit committee of the Board of Estimate upon practically every detail of subway construction now awaiting the action of the two bodies, except for the choice to be made between Fulton Street and Lafayette Avenue for the westerly section of the proposed Brooklyn crosstown subway.

In accordance with an agreement with the committee, reached in conference, the commission has submitted to the Board of Estimate alternative routes covering both Fulton Street and Lafayette Avenue, with the request that the board indicate which route it approves and with the assurance that work will be started promptly on the route to receive the board's approval, whether or not the choice of the commission, in this instance the Fulton Street route, is followed.

The commission and the transit committee have been deadlocked since the commission was established to succeed the old Public Service Commission of the First District and the Transit Construction Commissioner. The agreement which has now been reached is believed to have removed the last obstacle to new subway construction.

Broader Regulatory Power Sought in New Jersey

Legislation which would permit the State Board of Public Utility Commissioners of New Jersey to apply directly to the Court of Chancery for a receiver to operate any public utility which refuses to provide service to the public in an emergency was recommended in the annual report of the board, submitted to Governor Silzer on Jan. 2.

The board also made recommendations growing out of the controversy between jitney owners and the Public Service Railway, and during the water scarcity which tied up many industries last fall.

The report said the attitude of the Public Service Railway toward the board's order to resume operation during the strike showed the necessity for legislation for emergency operation. After the board had ordered resumption of service the company had thirty days under the present law in which to appeal the order to the Supreme Court. The company filed its appeal on the last day, and meanwhile the public had no railway service and had still to wait until the Governor, at the request of the board, asked the Attorney General to apply for an injunction.

The report suggested that if the company believes such an order unfair, the company should notify the board of its intention to appeal the order and that the appeal be required to be made within five days after issuance of the order. Even in such cases, the report said, the Supreme Court should not grant a stay unless satisfied that the company cannot immediately fulfill the order and resume service.

It was also recommended that the present law imposing a fine of \$100 daily upon companies which refuse to provide service when ordered to do so by the board be amended to make the fine \$1,000.

Exclusion of jitneys from the public utility act and passage of another act giving power of regulation of buses and defining the extent of the regulatory powers were asked by the board. More rigid regulation of buses and a new method of licensing were requested.

Providence Employees Will Vote on New Wage

A referendum vote on the new wage and working agreement submitted by the union officials to the United Electric Railways, Providence, is to be taken shortly. The original demand presented two months ago provided for an increase of 19 cents an hour, but it is believed that this is down now to a 5-cent increase, which many employees are loath to accept, insisting that the union officials stick to a larger increase.

Business Agent James H. Coleman declines to state what the terms of the revised agreement are, and says that he wants the men to have an opportunity to express themselves by ballot before he has anything to say regarding it.

An increase of 5 cents an hour would make the maximum pay of motormen and conductors on two-men passenger cars 61 cents an hour, and of operators of one-man cars 66 cents, and would raise some of the mechanical department rates to 65 cents.

P. R. T. Will Determine Exact Purchasing Power of Dollar

To determine the exact purchasing power of the dollar, the Philadelphia Rapid Transit Company will institute at once a plan of market-basket shopping, according to an announcement made in the current number of *Service Talks*, the official magazine of the company. The results of the findings will be used in determining the wage scale.

The methods of the company's investigators will be exactly those of the housewife. They will make purchases in stores patronized by their employees, buying groceries, dry goods, fuel, and so on through the entire list of necessities.

Wide differences of opinion among government experts and other economists as to the actual cost of living caused the company to decide to gather its own figures, substituting them for the three-city average which has been the basis of the wage scale in the past. The determination to compile statistics that will reflect purely local conditions is back of the plan.

Experiences in England, where wage scales were based upon general statistics which did not fit local conditions, are pointed to by the company as examples of the injustice of the widely used method.

Details of the plan will be worked out by the Co-operative Council.

Stock Yards Help Business.—Since the Indianapolis & Cincinnati Traction Company established stock yards at Rushville, Ind., business has shown a good increase. The stock raisers of Rushville ship their live stock to Indianapolis market the traction way because of the quick service maintained on the electric line. From this station alone there are shipped from three to five cars each morning to the Indianapolis live stock market. To take care of the increased freight business on the Rushville and Greensburg divisions, the company is planning to add another train.

Railway Official Made Bank Director.—Minot J. Hill, general manager of the Trenton, Bristol & Philadelphia Street Railway, Bristol, Pa., has been elected a director of the Bristol Trust Company.

Canadian Engineer Studies Service at Cost.—H. L. Vercoe of Toronto, engineer for the Canadian National Electric Lines, visited Rochester recently to study the provisions of the service-at-cost contract under which the Rochester lines of the New York State Railways are operated, with a view to putting a similar contract into effect between the city of St. Catharines, Ont., and the Canadian National Lines.

Financial and Corporate

Issue of Securities Approved

Providence Company to Be Compensated to Extent of \$2,079,200 for Ex- tensions and Improvements

The United Electric Railways, Providence, R. I., has been authorized to issue bonds and stock to the amount of \$2,079,200 by the Public Utilities Commission. That body has approved the company's amended petition, by which it will issue \$1,455,000 of twenty-five year 6 per cent prior lien gold bonds and capital stock to the amount of \$624,200. The company seeks to reimburse itself for expenditures made from its treasury for betterments, improvements and new equipment.

Prof. Charles B. Breed, engaged by the commission to examine the company's accounts and equipment, said that he was of the opinion that the total amount set forth in the company's petition was properly chargeable to capital, except \$907.32, representing a part of the Federal excise tax paid by the company for certain equipment. This amount, Professor Breed, said should have been deducted by the company from its tax returns, thereby decreasing its operating expenses. The petition was accordingly amended to conform to the recommendations.

In touching on the value of the traction company, Professor Breed stated that if the property was worth \$22,000,000 in 1920 at the time of the reorganization he believed that a fair value now is at least \$25,000,000.

The only items that Professor Breed would not approve as proper to be charged to capital account were those including Federal excise taxes on buses, trucks and equipment. This total is given as \$7,258.58. The company, he said, can claim a reduction from taxable income of this full amount, but as the income tax is 12½ per cent of taxable income, the company's operating expenses are reduced by this item only 12½ per cent. That part of the tax, \$907.32, is operating expense, he stated, and the balance chargeable to capital account.

In speaking of the depreciation set up by the company, approximating \$700,000 a year, Professor Breed said that it compared favorably with similar accounts approved by other state commissions on well-managed properties.

In conclusion, Professor Breed said:

I therefore conclude that these new acquisitions have been clearly for the increase of necessary facilities, both in amount and in type and quality, and that \$2,079,227 is properly chargeable to capital account within the meaning of the act under which the petition is brought.

H. B. Shaftoe, comptroller of the company, revised the proposed stock and bond issues to conform to the

change suggested by Professor Breed. His figures showed that a twenty-five year 6 per cent prior lien gold bond issue totaling \$1,455,000 would be made and that the capital stock issue would be placed at \$624,200. As indicated previously, these figures were approved by the commission.

Receiver Appointed for New York & Long Island Traction

Charles L. Addison, president of the company, has been appointed receiver of the New York & Long Island Traction Company, Hempstead, N. Y. The appointment was made in the Queens Supreme Court on Dec. 21 by Justice Van Sicken on the contingency that operation of the line is to be kept up.

The appointment of Mr. Addison as a receiver followed the serving of a summons and complaint upon officials of the railway in an action brought in the Nassau Supreme Court by Lincoln C. Andrews, receiver of the New York & Queens County Railway.

Several weeks ago the receiver of the New York & Queens Railway obtained an order directing the First National Bank of Hempstead, the depository of the funds of the New York & Long Island Traction Company, to pay to the Queens company receiver \$29,107, money owed to the New York & Queens company for a number of years. An examination of the company's financial status in supplementary proceedings brought out the fact that the company is not financially sound and Mr. Andrews immediately began an action to have a receiver appointed. In addition it is alleged that several other large judgments are outstanding against the company.

No Intention of Abandonment by West Virginia Road

The Sistersville & New Martinsville Traction Company, Sistersville, W. Va., has no intention of discontinuing operation between Sistersville and New Martinsville. Information published in the ELECTRIC RAILWAY JOURNAL for Oct. 27 to the effect that such suspension of service was being sought is learned now to be without any foundation in fact. As a matter of fact, the company has purchased three new cars of the latest type and equipment and they are expected to be delivered by Feb. 1, 1924. The Sistersville & New Martinsville Traction Company is the successor of the Union Traction Company and it operates over the same right-of-way and through the same communities in which that company operated for several years, until purchased and reorganized in July, 1919, since which time the property has been rebuilt and put in good operating condition.

Readjustment Terms Announced

United Light & Railways States Con- ditions of Security Exchange Now Pending

In addition to dropping the name of "Railways" and substituting that of "Power" and incorporating under the laws of Maryland instead of those of Maine, the financial readjustment plan of the United Light & Railways Company, Grand Rapids, Mich., provides for the issue by the company of two classes of preferred and two classes of common stocks.

The proposed plan narrows the control of the company by dividing the present common stock into two classes and giving voting power to only one of these classes.

It gives owners of first preferred a 6½ per cent issue instead of the 6 per cent stock they hold at the present time. The new stock is Class A preferred, to be exchanged share for share, callable at \$105 a share, cumulative, with preference in liquidation and in dividends over all other classes of stocks of the company, entitled to receive \$10 and all accumulated dividends in event of liquidation.

Present holders of participating preferred, a 7 per cent issue which has been paying an extra dividend of 1 per cent this year, receive the new Class B preferred, two of the new for one share of the old. The new Class B pays \$3.50 per share per annum, quarterly, cumulative, participating to the extent of 50 cents per annum per share whenever common stock pays at the rate of more than \$1.40 per share per annum. As the new common will probably be started off on the basis of \$1.60 per annum for the first quarter it appears that the Class B would net 8 per cent actually as does its equivalent, the present participating preferred. The new Class B is to have preference in liquidation and dividends over all classes of common, callable at \$60 per share, holders to receive \$50 per share and accumulated dividends in case of liquidation.

Common stockholders, for each share of the present issue, are to receive three shares of the new Class A common, two shares of the new class B common and an optional purchase warrant entitling the holder to buy one share of class A common at \$35 a share any time before Dec. 31, 1925. Class A and Class B common is to be in all respects the same except that Class B has the sole voting rights.

These common stocks will receive the first quarterly dividend by May 1, 1924, to be at the rate of \$1.60 per annum.

Of the four new stocks there are authorized 500,000 shares of Class A preferred, no par value; 500,000 shares of Class B preferred, no par value; 250,000 shares of Class A (non-voting) common no par value, and 250,000 shares of Class B common, sole voting, no par value.

Good Showing by I. R. T.

New York Company Succeeded in Cutting Deficit in Net Corporate Income from \$2,766,798 to \$131,795

The annual report of the Interborough Rapid Transit Company, New York, for the fiscal year ended June 30, 1923, shows a net operating income deficit of \$131,794. This, however, is an improvement of \$2,635,002 over the year before.

The more favorable results in net corporate income for the year were

COMPARATIVE STATEMENT OF INCOME ACCOUNT OF INTERBOROUGH RAPID TRANSIT COMPANY

Year ended June 30	1923	1922
Gross operating revenue...	\$55,559,435	\$53,540,859
Operating expenses.....	34,392,508	32,272,509
Net operating revenue..	\$21,166,927	\$21,268,350
Taxes.....	2,662,316	2,802,824
Income from operation.	\$18,504,616	\$18,465,526
Non-operating income....	573,850	652,875
Gross income.....	\$19,078,466	\$19,118,401
Income deductions.....	19,210,261	21,885,199
Net corporate income for the year.....	\$131,795	\$2,766,798
Add:		
*Surplus, June 30, 1922, and June 30, 1921....	\$524,866	\$2,242,878
Other credits, net.....	145,638	19,343
Totals.....	\$511,023	\$504,576
Appropriated for:		
Miscellaneous charges..	\$13,759	\$20,290
Total appropriations...	\$13,759	\$20,290
*Profit and loss.....	\$524,783	\$524,866

* Stated exclusive of accruals under Contract No. 3 and related certificates payable from future earnings.

brought about largely by a decrease of \$2,490,000 in the dividend rental paid for use of the elevated lines, together with a net reduction of \$184,937 in interest on various securities and all other income deductions.

The percentage of expenses to earnings at which the company operated was 61.90. The number of passengers carried was 1,025,175,131. This figure includes 155,786 half-fare (2½ cent) passengers made up of school children handled during the New York City Jubilee from June 4 to June 22. The daily average of passengers carried increased 86,801, but the total of passengers carried on the "L" lines for the two years differed only between the figure of 348,524,700 for the 1923 year and 348,517,216 for the 1922 year, or only 7,484 passengers. This small increase, however, compared with a very substantial decrease in the previous year indicates that the falling off in the elevated travel has terminated.

Gross operating revenue for the year was a gain of \$2,018,576, the result of a gain on the subway division of \$1,701,417, and a gain on the elevated railway division of \$317,159.

The gain in the revenue from the transportation of passengers was \$1,577,759 and the increase in the other street railway operating revenue (principally from the sale of power) \$440,817.

Operating expenses increased \$2,119,999, of which \$1,590,714 was on

the subway division and \$529,285 on the elevated division, the increase being due substantially to cost of additional train service and an increase in the cost of coal, but lessened by the savings due to use of multiple-unit door control on subway cars and of automatic turnstiles on stations.

During the year \$9,305,846 was spent for maintaining the structure, roadway, power houses, electrical equipment and rolling stock in good operating condition.

For additions and betterments to the property \$4,086,621 was spent during the past year. This sum includes the company's contribution toward new construction and equipment and expenditures in the acquisition of 100 new subway steel trailer cars.

Of the increase in transportation and traffic expenses the sum of \$1,343,622 was in the item of "fuel for power," reflecting the high cost of fuel during the year as well as the additional coal required due to the strike in the summer of 1922.

Expenditures for maintenance and improvements were unusually large. Considerable replacing and reinforcing work, together with other miscellaneous repairs and improvements, was performed on the elevated structure, always keeping it up to the standard required for safe and economical operation.

The \$19,210,261 of income deductions was made up of the following items:

STATEMENT OF INCOME DEDUCTIONS OF INTERBOROUGH RAPID TRANSIT COMPANY

Interest and sinking fund on city bonds.	\$2,584,035
Interest on Interborough Rapid Transit Company first and refunding mortgage 5 per cent gold bonds.	8,032,090
Sinking fund on Interborough Rapid Transit Company first and refunding mortgage 5 per cent gold bonds.	2,136,051
*Interest on ten-year 7 per cent notes.	2,303,076
Interest on ten-year 6 per cent notes.	65,146
Interest on equipment trust certificates, series "A."	389
Interest on Manhattan Railway consolidated mortgage 4 per cent bonds.	1,627,320
Interest on Manhattan Railway second mortgage 4 per cent bonds.	180,920
Manhattan Railway rental (organization)	50,000
Dividend rental on Manhattan Railway capital stock.	1,710,000
Interest on unfunded debt.	175,901
Other rent deductions.	295,653
Interest on investment of depreciation reserve.	48,800
Amortization of debt discount and expense on Manhattan Railway second mortgage 4 per cent bonds.	880
Total income deductions.	\$19,210,261
Per cent expenses to earnings.	61.90
Passengers carried.	1,025,175,131

* Includes interest on three-year 7 per cent notes from July 1 to Sept. 1, 1923.

† Includes 155,786 half-fare (2½-cent) passengers—school children, during New York City Jubilee June 4 to June 22, 1923.

The increase in service to the company's schedule during the year made necessary large improvements and additions to the power house equipment. As for cars 100 new subway trailers have been received for additional service. In this connection it is explained that since the period covered by the report, the 100 cars just mentioned have been put into service and that 100 additional motor cars have been ordered for the subway.

Detroit Compensation Fixed

Report Presented by Arbitrators Appointed to Adjust Charges Between Municipal and Private Line

The findings of the board of arbitrators, appointed in accordance with the purchase contract between the city of Detroit and the Detroit United Railway when the city took over the Detroit United lines to decide what the company should pay the city for the use of tracks of the municipal railway and what the city should pay the Detroit United Railway for power and for the use of Detroit United Railway tracks will reduce the estimated net income of the municipal system approximately 50 per cent. Many complications were met by the arbitrators, and it is the opinion of some of the officials that the award will affect the municipal railway department's program for maintenance, rehabilitation and reconstruction in the future.

The first session of the board was held on Jan. 4, 1923. Since then the board has been in session eighty-six days. A voluminous record was taken. Many witnesses were called and numerous exhibits of statistics, operating costs and valuations were introduced. The findings of the board were unanimous. More than fifty factors were found to have a bearing in the case. The rules established provide that the company shall pay a rental including a proportion of the joint operating expenses, maintenance and replacement of property; a proportion of the taxes, of replacement reserves, interest on the investment in the fixed property and interest on the working capital used in the business.

Either a ton-mile or car-mile basis was used in figuring the operation of D. S. R. and D. U. R. cars over the tracks employed for joint operation. The fact the D. S. R. cars had an average weight of seventeen tons each and the D. U. R. interurban cars had an approximate average weight of twenty tons each was considered in estimating the amount of damage to roadbeds, the ton-mile unit being used to differentiate between the two classes of cars in the division of costs.

As a result of the award in the arbitration, auditors for the municipal system have started to compute the net earnings of the lines since the city took them over in May, 1922. Each month since May, 1922, the reports of earnings have included an estimate of the rental the D. U. R. would pay the city. This rental as decided by the arbitrators is more than 50 per cent less than the estimates carried from month to month.

It is estimated that the net income of the municipal railway for the fiscal year ended June 30, last, may be reduced from approximately \$938,000 to \$365,000 owing to the fact that the rentals were estimated at figures greatly in excess of the terms named in the award. It was further announced that the sum of \$476,035 was due the city, being the balance between the

sum of \$549,962, which the company owed the city for the use of D. S. R. tracks for the fiscal year, and the \$17,297 due the D. U. R. for the use of its tracks, and \$56,629 the city owed the company for power used.

Provision for a sliding scale, or flexible compensation, was included in the report of the arbitrators covering the period since last July and retroactive to that month. Separate books will be kept by the company and the city and bills will be rendered monthly and rules established by the arbitrators will be followed by the auditors in determining what each party owes the other on track rental account.

The board of arbitrators was made up of the following members: William E. Davis, Cleveland, chairman; Prof. Henry E. Riggs of the University of Michigan, representing the company, and H. M. Gould, electrical engineer of the D. S. R., representing the city.

Bids for Massachusetts Properties Rejected

With the authority of the Massachusetts Supreme Court, D. P. Abercrombie, receiver for the Northern Massachusetts Street Railway, has rejected all bids submitted for properties of the company, which was ordered to suspend service on Dec. 31 and sell its holdings. The receiver was thereupon authorized to dispose of the properties by private sale at the best terms feasible.

An extension of time was granted for operating the section between Athol and Orange on pledges from fifty citizens of the two towns to make good any losses that might be incurred in operating the road up to March 31. Stock subscriptions to purchase this stretch of road will meanwhile be solicited, a substantial start having already been made on the enterprise.

On the day that this decision was reached by the court, announcement was made of the purchase of the section from Gardner to Templeton by a New York agent said to have acquired the line for a local company in process of formation, at a price much higher than that represented by the bid previously submitted. Included in this deal is a portion of the main line running from Reilly's switch in Templeton through East Templeton and West Gardner to South Gardner, and the branch line from Baldwinville through Otter River to East Templeton. The situation has been complicated, however, by the action of the City Council of Gardner in granting a license to the Flanagan Bus Company to operate buses from Gardner to Fitchburg by way of Westminster, and also of Templeton, East Templeton, Baldwinville and Otter River. This vote was taken on Dec. 28, immediately after the purchase of the railway property was announced.

There has been a great deal of sentiment in Gardner in favor of buses, whereas the prevailing sentiment in

Templeton is strongly favorable to the trolleys as best meeting the needs of that town. The outcome of the Gardner-Templeton situation is not yet clear.

Of the Connecticut Valley Street Railway's lines, also offered for sale by Mr. Abercrombie as receiver, and on which service is ordered to be discontinued on March 31, the prospect is that the line from Northampton to Amherst will be kept running either through purchase in the meantime or pledges of local citizens to make good any losses pending satisfactory arrangements for operation by some other concern. At a meeting of the Northampton City Council on Dec. 27 a proposal for joint operation with the town of Hatfield of the line from Northampton to Hatfield under the transportation area plan was rejected. This action followed a citizens' mass meeting at which sentiments strongly adverse to this proposal were expressed. The prospect is, therefore, that the entire line between Northampton and Greenfield, by way of Hatfield and Deerfield, will cease to operate by March 31.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were no sales of electric railway securities this week.

Stock Increased for Purpose of Exchange.—The authorized and outstanding capital stock of the Charleston Interurban Railroad, Charleston, W. Va., has been increased from \$1,500,000 to \$3,000,000. The new stock is all preferred. It will be used in part, it is said, in carrying out an exchange for the stock of the Kanawha Valley Traction Company and the Charleston-Dunbar Traction Company, both of which the Charleston Interurban now operates under lease.

Net Income Increases.—For the eleven months ended Nov. 30, 1923, the Philadelphia Rapid Transit Company reports a net income of \$1,890,729, against \$1,850,259 for the same period a year ago. There were 837,033,668 passengers carried in the eleven months of the past year, which represents an increase of 64,058,332 over the traffic for the first eleven months of 1922. The passenger revenue increased from \$37,937,833 for the 1922 period to \$40,275,327 for the period from January through November, 1923.

Net Income Increases.—The Brooklyn City Railroad for the five months ended Nov. 30, 1923, reports a passenger revenue of \$4,880,417, against \$4,861,766 for the same period a year ago. Operating expenses and taxes showed an increase of from \$4,016,433 for the period ended Nov. 30, 1922, to \$4,048,268 for the same period of the past year. The net corporate income of 1923 for the five months ended Nov. 30 was \$792,341. For the five months ended November, 1922, the net income was \$783,016.

Discontinuance Allowed.—The New Hampshire Public Service Commission recently authorized the Massachusetts

Northeastern Street Railway to discontinue service between Salem (N. H.), Pelham and Hudson and Taylor's Falls Bridge in Nashua. The award of the commission will permit the company to discontinue the service between Nashua and Lowell and Nashua and Lawrence. Fourteen miles of track are affected by the decision. The decision of the commission provides that the property shall be sold to the Nashua Street Railway or any other purchaser if the purchaser will pay as much for it as may be obtained by scrapping the road. In the petition to the commission by the Massachusetts Northeastern Company it was stated that the branch was not earning operating expenses.

Receiver Appointed.—An order placing the Alamance Railway, Burlington, N. C., in receiver's hands has been signed by Federal Judge E. Yates Webb upon petition of the American Trust Company of Richmond, Va. J. H. Bridges of Burlington is named receiver. The receivership is a result of defaulted payment of interest on \$120,000 in bonds held by the petitioner. The receiver is authorized to continue the operation of the line connecting Burlington, Graham and Haw River. The line is 8 miles long.

Power House Property Sold.—After many postponements, the power house property of the New York Railways at First Avenue and Ninety-fifth Street and the North River, New York, was sold on Jan. 2 in foreclosure proceedings to the New York Edison Company at the upset price of \$800,000. The sale must be confirmed by the court. The plant will eventually be modernized and used by the Edison company.

Committee on Consolidation Appointed.—Joseph Gilfillan and John J. Sullivan were appointed as a committee to represent the Union Traction Company in conferences to be held with the committee already appointed by the Philadelphia Rapid Transit Company and to be appointed by the Philadelphia Traction Company relative to the proposal for the consolidation of the street railway companies in Philadelphia. The meeting of Philadelphia Traction has been delayed, it is understood, due to slight illness of Joseph E. Widener. Recently Mr. Gilfillan, in a letter to the Philadelphia companies, pointed out that a plan looking to a simplification of the present corporate structure should be in the direction of a consolidated ownership of all lines in one corporation.

New Director Named.—Following a meeting of the Co-operative Welfare Association of the Philadelphia Rapid Transit Company, J. Morris Massey was unanimously chosen president for next year. By virtue of his office he will represent the employees on the company's directorate. Mr. Massey has worked for the Philadelphia company for the last twenty-eight years and is now a clerk in the Callowhill Street carhouse of the company. As head of the Welfare Association he succeeds Ralph R. Nyman.

Traffic and Transportation

Jitney Ordinance Unconstitutional

Regulatory Measure Enacted at Detroit, Long in Litigation, Ruled Against by Circuit Court

The jitney ordinance at Detroit was declared unconstitutional by Circuit Judge Ormond F. Hunt in a decision handed down on Dec. 29. The court also made permanent the injunction restraining the city and its officers from enforcing the ordinance. The court opinion stated that the ordinance was unreasonable from the viewpoint of public demand and general welfare, in excluding jitneys from the main streets and allowing other forms of transportation to use them, and that it was not a regulation but a prohibition of jitney service, which is inconsistent in view of the license granted by the ordinance. The jitney measure, intended to bar jitneys from the main traffic arteries, was passed by the City Council in May, 1922. It was to have become effective in the month of October, that year.

A NEW MEASURE PLANNED

It has been announced by Richard I. Lawson, Corporation Counsel for the city, that a new ordinance will be prepared for submission to the Council covering similar ground but intended to surmount the legal obstacles which the court has ruled exist in the 1922 measure. In view of the victory won in the court, Attorney Edward N. Barnard announced that the two jitney organizations, the Red Star Motor Drivers' Association and the Blue Ribbon Auto Drivers' Association, intend to buy 100 new cars at once and generally improve their service.

In reviewing the case it was cited that the ordinance was passed by the Council mainly at the request of James W. Inches, former Police Commissioner. The ordinance was approved by the old Council and it is believed that the popularity of the jitney has been proved to such an extent that the present Council is of different mind toward jitney transportation. Before the ordinance was put into effect the jitney drivers' association petitioned for an injunction restraining the city from enforcing the ordinance and a temporary injunction was granted by Circuit Judge Moynihan. Testimony on the petition for a permanent injunction was taken from June 5 to July 13 and from Sept. 24 to Nov. 2. About seventy-five witnesses were questioned. In the meantime the jitney drivers continued to operate under their 1922 licenses.

The court said that the jitney ordinance must be construed as reasonable or unreasonable, as related to the problem of transportation in its major and not in its minor aspects. In other

words, the question to be considered was: Would the enforcement of the ordinance as passed "promote the general welfare," the last phrase being quoted from the preamble to the Constitution of the United States?

The court recognized that the streets of Detroit, when they were laid out, were not designed to accommodate motor vehicle traffic, but said that only by the use of the surface by every known method of transportation could anything like an adequate and proper service be afforded. In other words, until Detroit had either a subway or an elevated line the general welfare demanded greater public service transportation facilities and not fewer.

In enacting the jitney ordinance the Council, so the court ruled, by implication of law, recognized the need of jitney service. Moreover, the need was confirmed by the testimony in the case.

The effect of the enforcement of the ordinance, excluding jitneys from the use of all the main arteries of travel, including parks and boulevards, would not be a regulation, but a prohibition of jitney service, a result not only inconsistent with the license granted therein, but unreasonable from the viewpoint of public demands and general welfare.

The court said that taking into consideration all the facts, circumstances and conditions of Detroit in relation to the demands for transportation, and the facilities for meeting that demand, the ordinance is in contravention of Section 28, Article 9 of the Constitution, which limits the authority and power of cities over their streets to "reasonable control."

DISCRIMINATION IS UNFAIR

It was held that the testimony showed that a seven-passenger automobile of standard model operated as a jitney was not in itself, or as operated, more dangerous than a motor vehicle privately operated. The court expressed the belief that to license buses and taxicabs to use all the streets, parks and boulevards, and at the same time exclude an ordinary automobile, called a jitney, from using the street, was discriminatory, class legislation and in contravention of Section 1, Article 2 of the Constitution of the State of Michigan, which provides:

"All political power is inherent in the people. Government is instituted for their equal benefit, security and protection."

Lower Fares in Effect.—The Des Moines City Railway accepted a fare of 7 cents from passengers on Dec. 27, a reduction of 1 cent over the rate in effect since Dec. 22, 1922. The points leading up to the fare cut were explained in the *ELECTRIC RAILWAY JOURNAL*, issue of Dec. 29.

Traffic Relief in Kansas City, Mo., Urged

The business men of Kansas City, Mo., are agitating for relief from the downtown congestion of traffic and for more convenient means for those people who live upon the boulevards to reach the shops. With 60,000 motor cars in the city a barricade of congestion has been thrown around the downtown business district. Parking rules are made and then remade. Still the traffic becomes more and more of a problem.

A committee has been appointed with J. Logan Jones as chairman, to make a survey of motor buses with the idea of introducing them in Kansas City, not only to relieve the congestion and to make the retail district more accessible to the shopper, but also to simplify crosstown travel. Mr. Jones has just returned from a trip east and is very enthusiastic about the idea of using the bus in Kansas City, not instead of the street car, but to work in conjunction with it, for he feels that in a city the size of Kansas City and doing the amount of business done there both the motor bus and the street car will be needed in order comfortably to handle the downtown crowds.

The business men feel that the street railway is the logical agency to operate the bus.

There are three types of bus service which Mr. Jones will outline to the business men of the Business District League:

1. A broad, comprehensive system of buses under a well-financed central management, covering the interurban territory in every direction in which good roads lead from Kansas City.
2. Intercity service between Kansas City, Mo., and Kansas City, Kan.
3. A Kansas City, Mo., service that would place buses on the boulevards and the main avenues.

It is anticipated that many people would patronize the bus who do not at present use the street car and are not likely to use the street car in the future. Most of these people either use their own motor car or else patronize the taxis.

It is felt by the business men that a broad plan of interurban, intercity and city bus lines would mean an increase by a third or a half of the shopping crowds in the retail district of Kansas City.

Jitneys Eliminated in Mobile

An ordinance adopted by the City Commissioners of Mobile, Ala., practically eliminates the jitneys from the streets. The ordinance was adopted Dec. 29. The vote on the adoption of the ordinance was two to one; Mayor Taylor and Commissioner Crawford voting for the ordinance and Commissioner Hartwell voting against it. The ordinance requires heavy indemnity bonds of the jitney owners. In fact these bonds are so heavy that it is said jitney owners will not be able to make them. Under the new ordinance the city will have the right to issue what will be known as "certificates of conveyance," under which buses can be

operated to sections not covered by street car lines of the Mobile Light & Railroad Company. In the opinion of the City Commissioners the streets of Mobile will soon be cleared of the jitneys under this new ordinance.

Theater Schedule Successful.—The Indianapolis & Cincinnati Traction Company has recently put into effect a theater schedule from Connorsville, Rushville and any intervening point to Indianapolis at one fare for the round trip. It was first advertised that if the patronage were sufficient the reduced fares and train schedules would maintain throughout the theatrical season. The new ruling permits a passenger to board any car after 2:30 o'clock in the afternoon for Indianapolis, attend the theater and return on the cars leaving Indianapolis at 9 o'clock or 11 o'clock. Results attained under this arrangement have been very satisfactory to the railway management. These fares and train schedules will be maintained during the present theatrical season. The company's plan was referred to in the *ELECTRIC RAILWAY JOURNAL*, issue of Dec. 8.

New Ticket Fare in Effect.—The Tri-City Railway, Davenport, Iowa, is now selling tickets at the rate of fifteen for \$1. The new fare went into effect on Jan. 1.

Will Discuss Transportation Problems.—Residents of the Irvington district of Portland, Ore., will make a concerted effort to obtain transportation facilities contiguous to the new Grant High School. The nearest car line to the new school is now eleven blocks away. At a community meeting to be held Jan. 21, President Franklin T. Griffith of the Portland Railway, Light & Power Company will send a representative of the company to meet with the Irvington Club and discuss transportation problems.

Splendid Safety Record.—The Nashville Railway & Light Company, Nashville, Tenn., is very proud of its safety record. During the year 1923 there were six different days in which no accident of any character whatever occurred. This means that all cars on the twenty-one local lines were piloted through Nashville's congested thoroughfares a total of 90,000 miles without even a minor mishap. Statistics compiled by the company show that ten motormen and conductors on the Meridian Street line hold the record of operating 30,000 miles without an accident. These gratifying results are attributed by the company to the persistent and steady safety campaign which has been carried on among the employees.

Buses in Operation.—Six buses have been placed in operation along Bailey Avenue in Buffalo by the International Bus Corporation, a subsidiary of the International Railway. A 7-cent fare or four tokens for 25 cents with free transfers is charged.

Passes in Case for Gifts.—The Tacoma Railway & Power Company, Tacoma, Wash., in order to stimulate

the sale of its railway passes during the pre-Christmas period, placed on sale at various stores and theaters in Tacoma a leatherette pass holder, containing five certificates which are redeemable for weekly passes, and selling the case and certificates for \$5. The holder and passes were suggested as suitable Christmas gifts.

Will Start Bus Operation.—The Lewistown & Reedsville Electric Railway, Lewistown, Pa., will start a bus service early in January, buses being purchased to be used for city traffic and interurban traffic to act as feeders for the traction line. The buses will carry twenty-one passengers, the cars now being especially fitted for passenger service to the Grove City, Pa., factory. The bus fare will be 6 cents, with transfer privileges to the trolley cars.

Bus Line Absorbed by Railway.—The West Penn Company, Pittsburgh, Pa., has purchased the Marietta (Ohio) Bus Company and it will, under the West Penn operation, be known as the Pioneer Transport Company. The new company will start operating buses early this year. The Marietta Bus Company owned five buses, which will now become the property of the new company. It is planned to use three of these buses for operation in connection with the city railway lines for part of the route over which they are operated, but they will be so scheduled that they come in between the scheduled headway of the street cars. The present rate of fare charged on the buses is four tickets for 25 cents and 7 cents cash. The rate on the street cars is 7 cents cash without the use of any reduced fare ticket.

Legal Notes

NEW JERSEY—*Quasi Public Corporation Must Perform Duties to Public.*

Where a mandamus is sought in a court of law to compel a public utility corporation to perform its duty to the public, the court of chancery will enjoin the performance of that duty pending the suit at law. It is not a defense that the company cannot operate at a profit; that is not the test; the duty resting upon a quasi public corporation must be performed, or its privileges and franchises must be surrendered; it cannot discharge its duty on and off, as it may find it profitable to do so. If the company does not obey the mandate of the court a receiver may be appointed. Mandamus is the proper remedy to compel a street railway company to operate its road for the benefit of the public. [McCran, Atty. Gen., vs. Public Service Ry. Co., 122 Atlantic Rep., 205.]*

NEW YORK—*Where Pedestrian Was Clearly Negligent a Charge Referring to Possible Error of Judgment Held Inapplicable.*

Where the defendant requested a charge that, if the jury found that plaintiff stepped in front of defendant's street car when it was going 9 or 10 m.p.h. and when it was only 10 ft. away at a point not at a street crossing, she was guilty of contributory negligence as a matter of law, and their verdict must be for defendant, and the court in response to the request, charged the jury so to find if they found it was negligent for her to do it, it was error for the court to add that it was for the jury to say whether plaintiff's act in pausing momentarily on the rail was a negligent act or merely an error of judgment. In this case there was no place for excuse of

error of judgment. [Ford vs. New York City Interborough Ry. Co., 140 Northeast. Rep., 720.]

OHIO—*Warnings of Dangers of Automobile Traffic Not Necessary.*

It is not the duty of a conductor or motorman to warn passengers, upon leaving a street car at a regular stop, of the danger of automobile traffic in a city street, and failure to caution such passenger so will not render the company liable for injuries caused by an automobile passing the car at an excessive rate of speed, and striking the passenger after he had alighted from the street car in safety. [Reining vs. Northern Ohio Traction & Light Co., 140 Northeast. Rep., 84.]

MISSOURI—*Negligence of Passenger in Automobile. Action for Death of Wife.*

In a wife's action for injuries in a collision between a street car and an automobile driven by her husband, where there was evidence that she was sitting on the front seat and was fully conversant with all that occurred, and she testified as to the rate of speed at which the street car and the automobile were traveling, the court properly refused an instruction authorizing recovery, though she might not have exercised reasonable care, and properly told the jury that they must find she was exercising reasonable care.

Where the wife dies as the result of such injuries, the administrator cannot maintain an action for her death where she left a husband and minor children surviving her, but if the death was due to other causes than the injury, the administrator can bring action and recover the same damages which the wife could have recovered if she had lived. [Longan vs. Kansas City Railways, 153 Southwest. Rep. 758.]

*This decision was published in full in *ELECTRIC RAILWAY JOURNAL*, issue of Sept. 22, page 461.

Personal Items

Gordon Campbell Retires

Gordon Campbell, president of the York Railways, York, Pa., will retire on Jan. 14. Mr. Campbell came to York Sept. 1, 1908, as vice-president and general manager of the company. In January, 1910, he was made president.

Mr. Campbell expressed the warmest appreciation of the many evidences of fairness which the company has received at the hands of public officials, the press and the citizens of York, which have materially contributed to bringing about the present excellent railway, lighting and power and steam service to the public. He also commended to York in the highest terms the loyal and efficient staff of the company, to which he gives the credit for such measures of success as he has had in his management. He understands that the property will be managed by Day & Zimmermann of Philadelphia.

Under his management, the revenue of the railway company has grown from \$527,000 in 1908 to \$2,000,000 in 1923, railway receipts from \$388,000 to \$952,000 and the light and power and steam receipts from \$116,000 to \$983,000.

More than \$2,500,000 has been expended in improvements during Mr. Campbell's régime. All of York's railway lines have been reconstructed and new cars have been purchased.

He was graduated as mechanical engineer from Stevens Institute in 1886 and entered the railway field as a draftsman at the Denver shops of the Union Pacific Railway shortly thereafter. Subsequently he became superintendent of the Colfax Electric Railway, Denver; purchasing agent and master mechanic of the North Jersey Street Railway, Newark, N. J.; general superintendent of the railways in Providence, R. I., now operated by the United Electric Railways, and purchasing agent of the Washington Railway & Electric Company, Washington, D. C. This was followed by his connection in August, 1908, with the York Railways as vice-president and general manager, that position having been retained until he was promoted to the presidency of the York company. In June, 1918, he was elected president of the Pennsylvania Street Railway Association and served in that capacity for two years.

After a short rest Mr. Campbell proposes to devote himself to the study of public utility problems on a larger scale.

G. O. Nicolai has been appointed general manager of the Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company, succeeding E. M. Walker, who resigned recently to accept the presidency of the

Schenectady Railway. Mr. Nicolai was formerly superintendent of the light and power division of the Terre Haute Traction & Light Company.

Byron E. Bramble Appointed Comptroller of Illinois Property

Byron E. Bramble has been appointed comptroller of the Illinois Power & Light Corporation and the North American Light & Power Company, with headquarters at Chicago, according to an announcement made by William A. Baehr, vice-president and general manager of the company.

Mr. Bramble was born at Decatur, Ill. After leaving school his first posi-



B. E. Bramble

tion was in the capacity of meter reader and clerk in the employ of the Decatur Gas & Electric Company.

In 1904 the Decatur Gas & Electric Company became the property of the Illinois Traction Company and was one of the first public utility companies in Illinois taken over by the company, later to be known in Illinois as the McKinley system. In 1905 Mr. Bramble was transferred to the Champaign office of the company and became general auditor of the system. When the McKinley and Studebaker interests were merged in June, 1923, as the Illinois Power & Light Corporation. Mr. Bramble remained at Champaign as general auditor of the new corporation.

He is succeeded as auditor by his former first assistant, L. L. Campbell, Champaign, Ill.

C. P. Taylor, heretofore assistant superintendent of terminals at Norfolk, Va., for the Norfolk & Western Railway, has been appointed chief electrical engineer. He will be succeeded in his former position by B. L. Thompson.

Henry Grant with Tacoma Interurban

Henry Grant, superintendent for the Stone & Webster interests centering in Everett, Wash., has been promoted to the superintendency of the Tacoma interurban and allied lines, assuming his duties Jan. 1. Mr. Grant has been transportation head in Everett since May, 1919, upon his release from the U. S. Army service, in which he served as captain. During his service in Everett he supervised the transfer of the Everett traction lines from electric driven rail lines to motor buses. Mr. Grant will be succeeded by C. C. Coates, former assistant railway superintendent of the Stone & Webster interests in Everett.

C. C. Brown has been promoted from chief clerk of the accounting department of the New York State Railways at Rochester to the auditorship of the Utica-Oneida-Syracuse lines. In 1904 Mr. Brown entered the employ of the Rochester & Eastern as construction engineer. That same year he was appointed general freight and express agent, which position he held for about two years. In February, 1907, on the changing of the ownership of the road, he was placed in charge of the Canandaigua office, where he remained until 1909, when he was transferred to the Rochester office. In August, 1919, he was appointed chief clerk by J. M. Joel and has served in that capacity up until the time of his promotion on Dec. 1 of last year. His headquarters are at Utica.

Obituary

James Adkins, secretary and treasurer of the United Railways Company of St. Louis and its predecessors for the past thirty-three years, died on Dec. 25. For years he had the reputation of being the worker with the longest day at the United Railways headquarters. Mr. Adkins was seventy-two years old. In 1890 he became secretary and treasurer of the old Lindell Railway and continued in that position with the St. Louis Transit Company and later with the United Railways. He was also president of the United Railways Savings & Loan Association.

Edward Preston Usher, active in electrical invention in New England in the earlier days of the industry, died at Grafton, Mass., on Dec. 26. He was born at Lynn, Mass., in 1851, and about thirty years ago became president of the Milford & Hopedale Street Railway, where he invented a storage battery for street car propulsion which attained considerable success until its displacement by the overhead trolley system. His patents were later used in general storage battery manufacture and were sustained in prolonged litigation between the Brush Electric Company and the Hopedale Electric Company, the latter being formed to exploit the Usher apparatus.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Progress of Industrial Standardization

An appeal to manufacturers throughout the country to give more attention to the elimination of excess varieties during 1924 is contained in a pamphlet just issued by the Fabricated Production Department of the Chamber of Commerce of the United States. The department suggests that manufacturers who have not already done so undertake to simplify and standardize their products at the next inventory.

During the past year industrial standardization has continued to develop as one of the most active and important phases of American industry. Progress has been made in the standardization of raw materials, manufacturing processes and finished products. This is equally true whether looked at from the point of view of the factory, of the industrial or technical association or of a national movement. More than 150 undertakings now have official status before the American Engineering Standards Committee, the national clearing house for standardization. Fifty standards have received final approval by the committee, twenty-two of which were approved during 1923.

By the elimination of excess varieties which manufacturers are producing and carrying in stock the annual inventory can be more easily made.

Increased facility of inventory taking is only one of the manifold benefits and savings that accrue from a simplification and standardization project. For instance, such items as raw materials, purchased parts, component parts, finished product, cartons and packing cases are all amenable to the simplified practice treatment.

The dealer benefits through the reduced number of lines with their repair and accessory parts which he must carry in stock, the ultimate consumer finds the ready interchangeability of parts on his several machines of immense value and the supplier of raw materials experiences a substantial improvement in the facility with which his orders are processed and handled.

Large Increase in Copper Output

Smelter production of copper in 1923, as determined by the Department of the Interior from reports of the smelters showing the actual production for eleven months and the estimated production in December, was about 1,477,000,000 lb., compared with 950,000,000 lb. in 1922, an increase of slightly over 55 per cent. The smelter production of copper for December, as estimated by the producing companies,

was 132,000,000 lb., or at the rate of about 1,584,000,000 lb. a year.

Production of new refined copper from domestic sources was about 1,435,000,000 lb., compared with 905,000,000 lb. in 1922. In 1923 the production of new refined copper from domestic and foreign sources plus the imports of refined copper amounted to about 2,118,000,000 lb., compared with 1,359,000,000 lb. in 1922. In addition to the output of new refined copper about 130,000,000 lb. of secondary copper was produced at the refineries, compared with 146,000,000 lb. in 1922, so that the total output of refined copper was about 2,248,000,000 lb. in 1923 and 1,505,000,000 lb. in 1922.

Stocks of refined copper in the hands of domestic refineries on Dec. 31, 1923, as estimated by the refining companies, were about 256,000,000 lb., compared with 216,000,000 lb. on Dec. 31, 1922. The stocks of blister copper and material in process of refining, in the hands of the smelters, in transit to refineries and at refineries on Dec. 31, 1923, were estimated by smelting and refining companies at about 490,000,000 lb., compared with 361,000,000 lb. on Dec. 31, 1922. The quantity of primary refined copper withdrawn on domestic account in 1923 was about 1,305,000,000 lb., compared with 897,000,000 lb. in 1922.

Outlook for Business Good

By JOHN F. OHMER

President Ohmer Fare Register Company,
Dayton, Ohio

Industrial, financial and mercantile activities in the year of 1923, the fifth year after the World War, were without precedent. The production of our mines and forests was severely taxed to supply material for fabrication into commodities of every description. The requirements for steam and electric rolling stock taxed the capacity of car shops, and the automotive industry has had unlimited growth. No production has compared with the phenomenal increase in the number of vehicles manufactured last year. Notwithstanding the fact that more than four millions of automobiles were made and disposed of, the electric railway companies will show increased earnings.

The automobile has taught people to ride. Although it has congested the traffic in our cities to the point of intolerance, it is nevertheless certain that the well-managed electric railways and taxicab companies will profit by the automobile invasion.

Business apparently will continue good during 1924. The new business received by this company in 1923, the twenty-fifth year of its existence, has been the best in its history. Practically all expiring contracts were renewed for long terms, many of them by companies that have used Ohmer registers for more than twenty years. This mark of appreciation assures us that the successful manager realizes the importance of safeguarding that most important factor in his business—fare collection.

ELECTRIC RAILWAY MATERIAL PRICES—JAN. 2, 1923

Metals—New York		Paints, Putty and Glass—New York	
Copper, electrolytic, cents per lb.	12.875	Linseed oil (5 bbl. lots), per gal.	\$0.93
Lead, cents per lb.	7.80	White lead (100 lb. keg), cents per lb.	11.37
Nickel, cents per lb.	28.00	Turpentine (bbl. lots), per gal.	\$0.925
Zinc, cents per lb.	6.625	Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Tin, Straits, cents per lb.	47.25	Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Aluminum, 98 to 99 per cent, cents per lb.	26.00	Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Babbitt metal, warehouse, cents per lb.:		Putty, 100 lb. cans, cents per lb.	4-6
Fair grade.	52.00	*These prices are f.o.b. works, boxing charges extra.	
Commercial.	25.00	Wire—New York	
Bituminous Coal		Copper wire base, cents per lb.	15.50
Smokeless mine run, f.o.b. vessel, Hampton Roads.	\$4.675	Rubber-covered wire, No. 14, per 1,000 ft.	\$6.65
Somerset mine run, Boston.	2.125	Weatherproof wire base, cents per lb.	17.50
Pittsburgh mine run, Pittsburgh.	2.00	Paving Materials	
Franklin, Ill., screenings, Chicago.	1.875	Paving stone, granite, 4x8x4, f.o.b. Chicago, dressed, per sq. yd.	\$3.60
Central, Ill., screenings, Chicago.	1.375	Common, per sq. yd.	3.20
Kansas screenings, Kansas City.	2.00	Wood block paving 3 $\frac{1}{2}$ x 16 treatment, N. Y., per sq. yd.	2.79
Track Materials—Pittsburgh		Paving brick 3 $\frac{1}{2}$ x 8 $\frac{1}{2}$ x 4, N. Y., per 1,000 in carload lots.	54.00
Standard Bessemer steel rails, gross ton.	\$43.00	Crushed stone, 1-in., carload lots, N. Y., per cu. yd.	1.75
Standard open hearth rails, gross ton.	43.00	Cement, Chicago consumers' net prices, without bags.	2.10
Railroad spikes, drive, Pittsburgh base, cents per lb.	\$3.10	Gravel, 1-in., cu. yd., f. o. b. N. Y.	2.00
Tie plates (flat type), cents per lb.	2.575	Sand, cu. yd., N. Y.	1.25
Angle bars, cents per lb.	2.75	Old Metals—New York and Chicago	
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.125	Heavy copper, cents per lb.	11.25
Steel bars, cents per lb.	2.40	Light copper, cents per lb.	9.50
Ties, white oak, Chicago, 6 in. x 8 in. x 8 $\frac{1}{2}$ ft.	\$1.70	Heavy brass, cents per lb.	6.00
Hardware—Pittsburgh		Zinc, old scrap, cents per lb.	4.125
Wire nails, base per keg.	3.00	Yellow brass, cents per lb. (heavy).	6.00
Sheet iron (28 gage), cents per lb.	3.75	Lead, cents per lb. (heavy).	6.75
Sheet iron, galvanized (28 gage), cents per lb.	4.90	Steel car axles, Chicago, net ton.	\$8.25
Galvanized barbed wire, cents per lb.	3.80	Old car wheels, Chicago, gross ton.	20.25
Galvanized wire, ordinary, cents per lb.	2.75	Rails (short), Chicago, gross ton.	19.75
Waste—New York		Rails, (relaying), Chicago, gross ton.	33.50
Waste, wool, cents per lb.	11.14	Machine turnings, Chicago, net ton.	9.25
Waste, cotton (100 lb. bale), cents per lb.:			
White.	14-18		
Colored.	9-14		

Receiver Appointed for Missouri Car Company

Circuit Judge Landwehr of St. Louis on Dec. 27 named R. Vernon Clark, East St. Louis, Ill., real estate dealer, receiver for the Missouri Car Company, organized in St. Louis two years ago to manufacture a non-rollicking street car truck. The plant in East St. Louis never produced a single truck, although much machinery and other equipment were installed for the making of the trucks, street cars and automobile bus bodies.

The suit for the receivership was instituted Dec. 26 to checkmate a foreclosure on the company's plant and real estate by the East St. Louis Cotton Seed Oil Company for default on a note for \$7,500 due last June 1, but extended to Dec. 15. The note was not paid on Dec. 15.

It is stated in the receivership petition that the company has assets appraised at \$300,000 and liabilities totaling \$175,000. The factory was purchased for \$75,000, of which \$16,000 has been paid. The company has agreed to the appointment of a receiver.

Officials of the company are said to contemplate a complete reorganization, but the legal controversies in which the company is now involved and the diversity of the interests affected, together with the uncertainty of lien priorities, made it difficult, without the aid of a receivership, to determine the rights of the various parties to pay off existing claims and to operate the plant. It is said the company has several offers to purchase its plant, patents and other assets.

Westinghouse Acquires New Building in Cleveland

The Cleveland branches of the Westinghouse Electric & Manufacturing Company and the Westinghouse Lamp Company have consolidated in one building their sales and service departments and their warehouses. The branches are now located in a new five-story building, called the Westinghouse Electric Building, on Ashland Road.

Contract Renewed

A contract for the lubrication of electric railway lines of the Brooklyn-Manhattan Transit Corporation and the New York Rapid Transit Corporation has been renewed with the Texas Company. This includes the supply of lubricants required for all surface, elevated and subway equipment of the entire system. The products furnished will provide for the lubrication of more than 112,000,000 car-miles yearly.

Rolling Stock

Mauch Chunk & Lehigh Traction Company, Mauch Chunk, Pa., recently suffered the loss of seventeen cars and a carhouse by fire. The damage approximates \$200,000.

Maumee Valley Railways & Light Company, Toledo, purchased in 1923 from the Cincinnati Car Company six cars. The cars were constructed for one-man operation and have been operated so far in that way with an extra boy or veteran to flag railroad crossings. The seating capacity of the cars is forty-four.

Lewistown & Reedsville Electric Railway, Lewistown, Pa., has announced the purchase of four new cars, costing \$60,000. The cars are equipped for train operation.

Evansville & Ohio Valley Railway, Evansville, Ind., is considering the purchase of ten new light-weight inter-urban passenger cars.

The Interborough Rapid Transit Company, New York, N. Y., has recently ordered from the General Electric Company 200 GE-260 motors and 100 PC-10 control equipments to be used on 100 new cars which the railway company has bought.

Wheeling Traction Company, Wheeling, W. Va., it is reported, is now securing bids for twenty-one new all-steel passenger cars. The cars are to be of the double-truck type and will have a seating capacity for about fifty passengers.

Track and Line

Baton Rouge Electric Railway, Baton Rouge, La., plans track and road improvement which will include reconstruction of the Florida Street line. Concrete foundation will be used and the street will be widened to accommodate the tracks and necessary roadway. The line known locally as the Dixie Railway extension will be completed about June 1, 1924.

Monongahela-West Penn Public Service Corporation, Parkersburg, W. Va., has plans under way for extensive traction line improvements, including the taking up of abandoned tracks, a general rebuilding of existing lines that are to continue in use, and it is expected shortly that new cars and modern equipment will be added.

Trade Notes

Clifford F. Rice of West Springfield, Mass., has ended forty years of service with the Wason Manufacturing Company, Springfield, now controlled by the J. G. Brill Company.

A. E. Tregenza has resigned from the position he has held for the past eleven years as general sales manager of the Economy Fuse & Manufacturing Company, Chicago.

Wason Manufacturing Company, Springfield, Mass., a subsidiary of the J. G. Brill Company, has announced changes in its personnel effective Jan. 1. A. H. Pease, formerly secretary, has been elected vice-president, succeeding Henry Pearson, who died recently. Charles F. Johnson will be general

manager; Walter Abrahams, secretary and clerk, and R. T. Foster, superintendent.

Owen D. Young, chairman of the board of directors of the General Electric Company and recently selected as a member from the United States of the reparations committee to help balance the German budget and stabilize the mark, sailed for Europe from New York on Dec. 29. Two Americans were invited to serve, the other being Gen. Charles G. Dawes, former director of the United States budget.

New Advertising Literature

Department of Commerce, Washington, D. C., has issued a new edition of the Bureau of Standards circular on electric service standards. The material contained in the old edition has been revised when necessary and brought up to date. This first edition has been the basis for many of the rules for electric service which are now in force in many of the states, and which cover such subjects as the accuracy of meters and means for testing them, interruptions to service, variations in voltage on electric lines, safety provisions, methods of metering, etc. These rules for the various states are embodied in the circular and recommendations are made for the framing of such rules where they do not already exist. In collecting this material the Bureau of Standards sent its experts all over the United States to confer with commissions and engineers having to do with the regulation of public utilities. The department has also issued the first number of "Commerce Yearbook," a new annual of the Bureau of Foreign and Domestic Commerce. This new book presents in 700 exceedingly readable pages of text and diagrams the outstanding factors in domestic and foreign commercial development for 1922 and early 1923.

Two-thirds of the volume is devoted to domestic commercial growth for 1922, analyzing each of the great industrial and financial groups as to its trade, production, price changes and market conditions, these being conveniently tabulated and analyzed in relation to one another so that their interdependence may be readily recognized. The balance of the book is a survey of foreign conditions, particularly those affecting American trade. An economic review and statistical abstract of each of these principal foreign markets is presented.

Johns - Pratt Company, Hartford, Conn., has issued a pamphlet, "Both Sides of the Story." It tells how both the central station's needs and the contractor's requirements are met perfectly by the Noark universal service switch.

General Welding & Equipment Company, Boston, Mass., has issued a pamphlet with photographs on the automatic cutting machine for locomotive, railroad, machine parts and plate work.

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DURING the year just closed 79.5 per cent of the readers of the ELECTRIC RAILWAY JOURNAL have renewed their subscriptions. This is the measure used by the Audit Bureau of Circulations, and required in its reports, to indicate the value of a publication to its readers. It is a measure that can be gotten only when a paper has strictly a paid circulation.

This renewal percentage of the ELECTRIC RAILWAY JOURNAL subscribers is the highest of the fourteen McGraw-Hill publications, and is probably not equalled by any other magazine.

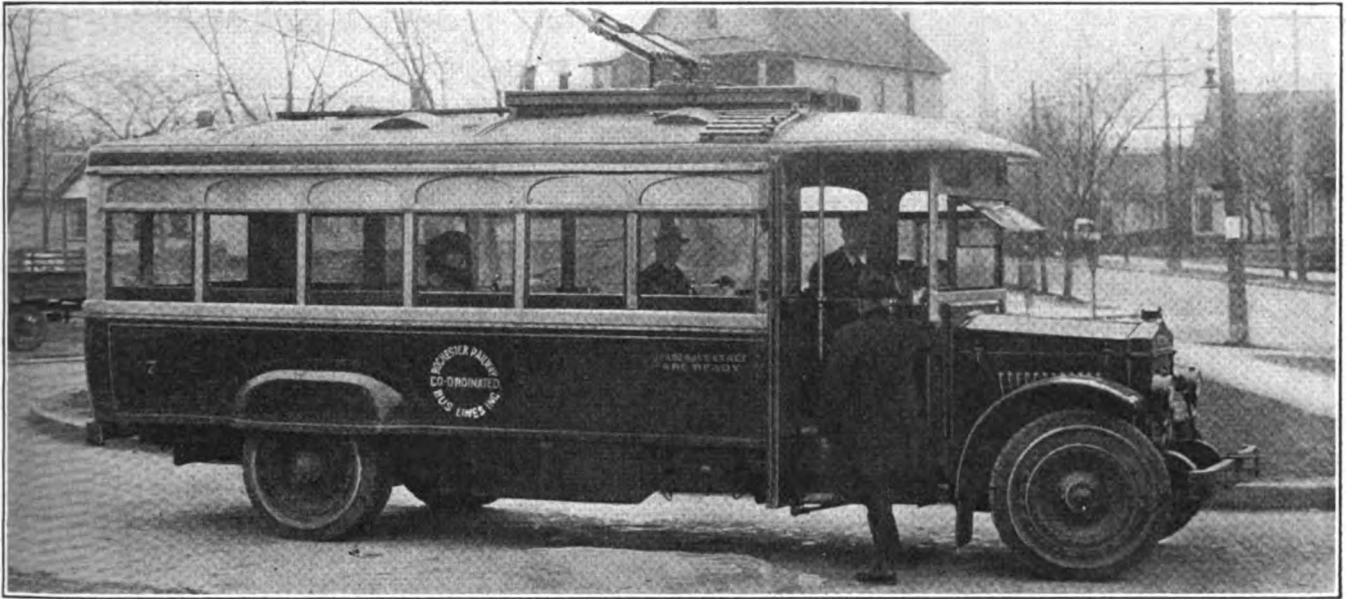
Such evidence of the high regard with which electric railway men hold this paper is indeed an inspiration to the editors and the publisher to keep on striving to make it a product of exceptional interest and practical value.

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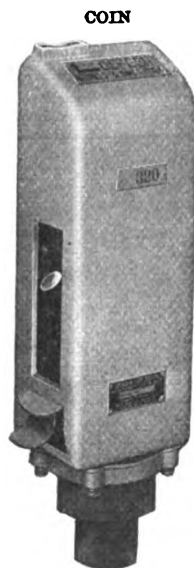
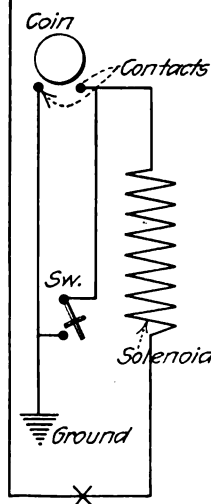
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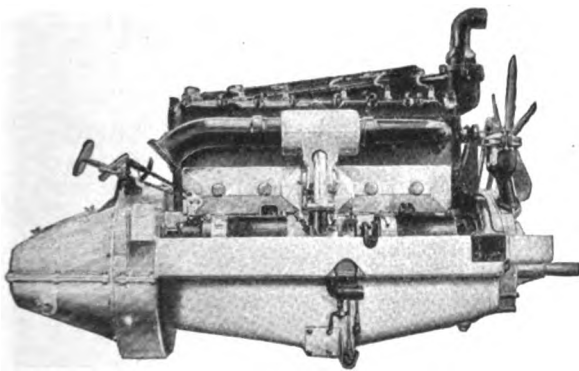
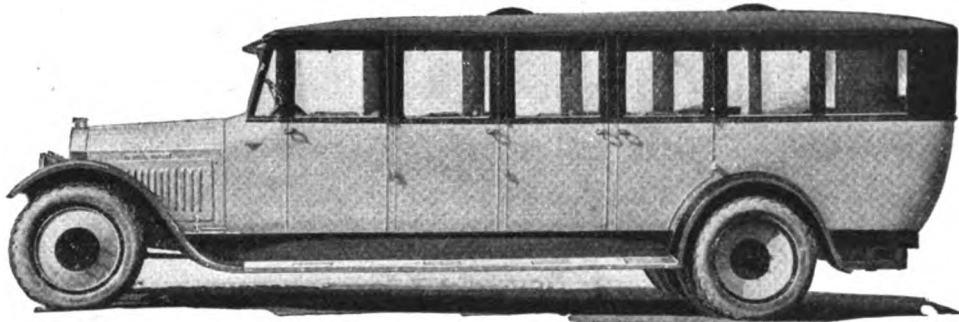
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The modern Pierce-Arrow Bus is suited ideally for supplementing electric railway facilities.

It is produced by the maker of automotive products which, during the last 23 years, have established high standards of economy, reliability and durability.

Designed solely and especially for motor bus operation, the modern Pierce-Arrow Bus meets the four great demands of this specialized field—comfort, speed, safety and economy. It is *not* an adapted or converted truck; *not* an elongated passenger car.

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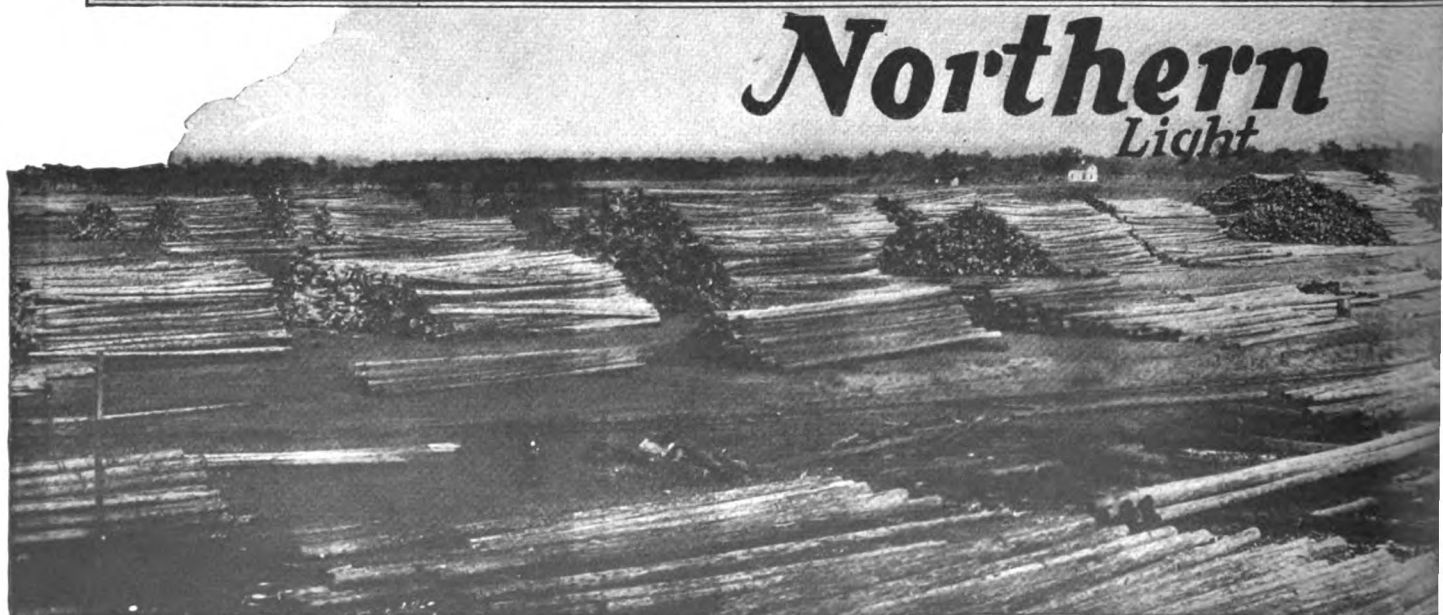
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Good Showing by I. R. T.

New York Company Succeeded in Cutting Deficit in Net Corporate Income from \$2,766,798 to \$131,795

The annual report of the Interborough Rapid Transit Company, New York, for the fiscal year ended June 30, 1923, shows a net operating income deficit of \$131,794. This, however, is an improvement of \$2,635,002 over the year before.

The more favorable results in net corporate income for the year were

COMPARATIVE STATEMENT OF INCOME ACCOUNT OF INTERBOROUGH RAPID TRANSIT COMPANY

Year ended June 30	1923	1922
Gross operating revenue....	\$55,559,435	\$53,540,859
Operating expenses.....	34,392,508	32,272,509
Net operating revenue..	\$21,166,927	\$21,268,350
Taxes.....	2,662,316	2,802,824
Income from operation.	\$18,504,616	\$18,465,526
Non-operating income....	573,850	652,875
Gross income.....	\$19,078,466	\$19,118,401
Income deductions.....	19,210,261	21,885,199
Net corporate income for the year.....	\$131,795	\$2,766,798
Add:		
*Surplus, June 30, 1922, and June 30, 1921....	\$524,866	\$2,242,878
Other credits, net.....	145,638	19,343
Totals.....	\$511,083	\$504,576
Appropriated for:		
Miscellaneous charges..	\$13,759	\$20,290
Total appropriations...	\$13,759	\$20,290
*Profit and loss.....	\$524,783	\$524,866

* Stated exclusive of accruals under Contract No. 3 and related certificates payable from future earnings.

brought about largely by a decrease of \$2,490,000 in the dividend rental paid for use of the elevated lines, together with a net reduction of \$184,937 in interest on various securities and all other income deductions.

The percentage of expenses to earnings at which the company operated was 61.90. The number of passengers carried was 1,025,175,131. This figure includes 155,786 half-fare (2½ cent) passengers made up of school children handled during the New York City Jubilee from June 4 to June 22. The daily average of passengers carried increased 86,801, but the total of passengers carried on the "L" lines for the two years differed only between the figure of 348,524,700 for the 1923 year and 348,517,216 for the 1922 year, or only 7,484 passengers. This small increase, however, compared with a very substantial decrease in the previous year indicates that the falling off in the elevated travel has terminated.

Gross operating revenue for the year was a gain of \$2,018,576, the result of a gain on the subway division of \$1,701,417, and a gain on the elevated railway division of \$317,159.

The gain in the revenue from the transportation of passengers was \$1,577,759 and the increase in the other street railway operating revenue (principally from the sale of power) \$440,817.

Operating expenses increased \$2,119,999, of which \$1,590,714 was on

the subway division and \$529,285 on the elevated division, the increase being due substantially to cost of additional train service and an increase in the cost of coal, but lessened by the savings due to use of multiple-unit door control on subway cars and of automatic turnstiles on stations.

During the year \$9,305,846 was spent for maintaining the structure, roadway, power houses, electrical equipment and rolling stock in good operating condition.

For additions and betterments to the property \$4,086,621 was spent during the past year. This sum includes the company's contribution toward new construction and equipment and expenditures in the acquisition of 100 new subway steel trailer cars.

Of the increase in transportation and traffic expenses the sum of \$1,343,622 was in the item of "fuel for power," reflecting the high cost of fuel during the year as well as the additional coal required due to the strike in the summer of 1922.

Expenditures for maintenance and improvements were unusually large. Considerable replacing and reinforcing work, together with other miscellaneous repairs and improvements, was performed on the elevated structure, always keeping it up to the standard required for safe and economical operation.

The \$19,210,261 of income deductions was made up of the following items:

STATEMENT OF INCOME DEDUCTIONS OF INTERBOROUGH RAPID TRANSIT COMPANY

Interest and sinking fund on city bonds.	\$2,584,035
Interest on Interborough Rapid Transit Company first and refunding mortgage 5 per cent gold bonds.	8,632,090
Sinking fund on Interborough Rapid Transit Company first and refunding mortgage 5 per cent gold bonds.	2,136,051
*Interest on ten-year 7 per cent notes.	2,303,076
Interest on ten-year 6 per cent notes.	65,146
Interest on equipment trust certificates, series "A."	389
Interest on Manhattan Railway consolidated mortgage 4 per cent bonds.	1,627,320
Interest on Manhattan Railway second mortgage 4 per cent bonds.	180,920
Manhattan Railway rental (organization).	50,000
Dividend rental on Manhattan Railway capital stock.	1,710,000
Interest on unfunded debt.	175,901
Other rent deductions.	295,653
Interest on investment of depreciation reserve.	48,800
Amortization of debt discount and expense on Manhattan Railway second mortgage 4 per cent bonds.	880
Total income deductions.	\$19,210,261
Per cent expenses to earnings.	61.90
Passengers carried.	1,025,175,131

* Includes interest on three-year 7 per cent notes from July 1 to Sept. 1, 1923.

† Includes 155,786 half-fare (2½-cent) passengers—school children, during New York City Jubilee June 4 to June 22, 1923.

The increase in service to the company's schedule during the year made necessary large improvements and additions to the power house equipment. As for cars 100 new subway trailers have been received for additional service. In this connection it is explained that since the period covered by the report, the 100 cars just mentioned have been put into service and that 100 additional motor cars have been ordered for the subway.

Detroit Compensation Fixed

Report Presented by Arbitrators Appointed to Adjust Charges Between Municipal and Private Line

The findings of the board of arbitrators, appointed in accordance with the purchase contract between the city of Detroit and the Detroit United Railway when the city took over the Detroit United lines to decide what the company should pay the city for the use of tracks of the municipal railway and what the city should pay the Detroit United Railway for power and for the use of Detroit United Railway tracks will reduce the estimated net income of the municipal system approximately 50 per cent. Many complications were met by the arbitrators, and it is the opinion of some of the officials that the award will affect the municipal railway department's program for maintenance, rehabilitation and reconstruction in the future.

The first session of the board was held on Jan. 4, 1923. Since then the board has been in session eighty-six days. A voluminous record was taken. Many witnesses were called and numerous exhibits of statistics, operating costs and valuations were introduced. The findings of the board were unanimous. More than fifty factors were found to have a bearing in the case. The rules established provide that the company shall pay a rental including a proportion of the joint operating expenses, maintenance and replacement of property; a proportion of the taxes, of replacement reserves, interest on the investment in the fixed property and interest on the working capital used in the business.

Either a ton-mile or car-mile basis was used in figuring the operation of D. S. R. and D. U. R. cars over the tracks employed for joint operation. The fact the D. S. R. cars had an average weight of seventeen tons each and the D. U. R. interurban cars had an approximate average weight of twenty tons each was considered in estimating the amount of damage to roadbeds, the ton-mile unit being used to differentiate between the two classes of cars in the division of costs.

As a result of the award in the arbitration, auditors for the municipal system have started to compute the net earnings of the lines since the city took them over in May, 1922. Each month since May, 1922, the reports of earnings have included an estimate of the rental the D. U. R. would pay the city. This rental as decided by the arbitrators is more than 50 per cent less than the estimates carried from month to month.

It is estimated that the net income of the municipal railway for the fiscal year ended June 30, last, may be reduced from approximately \$938,000 to \$365,000 owing to the fact that the rentals were estimated at figures greatly in excess of the terms named in the award. It was further announced that the sum of \$476,035 was due the city, being the balance between the

sum of \$549,962, which the company owed the city for the use of D. S. R. tracks for the fiscal year, and the \$17,297 due the D. U. R. for the use of its tracks, and \$56,629 the city owed the company for power used.

Provision for a sliding scale, or flexible compensation, was included in the report of the arbitrators covering the period since last July and retroactive to that month. Separate books will be kept by the company and the city and bills will be rendered monthly and rules established by the arbitrators will be followed by the auditors in determining what each party owes the other on track rental account.

The board of arbitrators was made up of the following members: William E. Davis, Cleveland, chairman; Prof. Henry E. Riggs of the University of Michigan, representing the company, and H. M. Gould, electrical engineer of the D. S. R., representing the city.

Bids for Massachusetts Properties Rejected

With the authority of the Massachusetts Supreme Court, D. P. Abercrombie, receiver for the Northern Massachusetts Street Railway, has rejected all bids submitted for properties of the company, which was ordered to suspend service on Dec. 31 and sell its holdings. The receiver was thereupon authorized to dispose of the properties by private sale at the best terms feasible.

An extension of time was granted for operating the section between Athol and Orange on pledges from fifty citizens of the two towns to make good any losses that might be incurred in operating the road up to March 31. Stock subscriptions to purchase this stretch of road will meanwhile be solicited, a substantial start having already been made on the enterprise.

On the day that this decision was reached by the court, announcement was made of the purchase of the section from Gardner to Templeton by a New York agent said to have acquired the line for a local company in process of formation, at a price much higher than that represented by the bid previously submitted. Included in this deal is a portion of the main line running from Reilly's switch in Templeton through East Templeton and West Gardner to South Gardner, and the branch line from Baldwinville through Otter River to East Templeton. The situation has been complicated, however, by the action of the City Council of Gardner in granting a license to the Flanagan Bus Company to operate buses from Gardner to Fitchburg by way of Westminster, and also of Templeton, East Templeton, Baldwinville and Otter River. This vote was taken on Dec. 28, immediately after the purchase of the railway property was announced.

There has been a great deal of sentiment in Gardner in favor of buses, whereas the prevailing sentiment in

Templeton is strongly favorable to the trolleys as best meeting the needs of that town. The outcome of the Gardner-Templeton situation is not yet clear.

Of the Connecticut Valley Street Railway's lines, also offered for sale by Mr. Abercrombie as receiver, and on which service is ordered to be discontinued on March 31, the prospect is that the line from Northampton to Amherst will be kept running either through purchase in the meantime or pledges of local citizens to make good any losses pending satisfactory arrangements for operation by some other concern. At a meeting of the Northampton City Council on Dec. 27 a proposal for joint operation with the town of Hatfield of the line from Northampton to Hatfield under the transportation area plan was rejected. This action followed a citizens' mass meeting at which sentiments strongly adverse to this proposal were expressed. The prospect is, therefore, that the entire line between Northampton and Greenfield, by way of Hatfield and Deerfield, will cease to operate by March 31.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were no sales of electric railway securities this week.

Stock Increased for Purpose of Exchange.—The authorized and outstanding capital stock of the Charleston Interurban Railroad, Charleston, W. Va., has been increased from \$1,500,000 to \$3,000,000. The new stock is all preferred. It will be used in part, it is said, in carrying out an exchange for the stock of the Kanawha Valley Traction Company and the Charleston-Dunbar Traction Company, both of which the Charleston Interurban now operates under lease.

Net Income Increases.—For the eleven months ended Nov. 30, 1923, the Philadelphia Rapid Transit Company reports a net income of \$1,890,729, against \$1,850,259 for the same period a year ago. There were 837,033,668 passengers carried in the eleven months of the past year, which represents an increase of 64,058,332 over the traffic for the first eleven months of 1922. The passenger revenue increased from \$37,937,833 for the 1922 period to \$40,275,327 for the period from January through November, 1923.

Net Income Increases.—The Brooklyn City Railroad for the five months ended Nov. 30, 1923, reports a passenger revenue of \$4,880,417, against \$4,861,766 for the same period a year ago. Operating expenses and taxes showed an increase of from \$4,016,433 for the period ended Nov. 30, 1922, to \$4,048,268 for the same period of the past year. The net corporate income of 1923 for the five months ended Nov. 30 was \$792,341. For the five months ended November, 1922, the net income was \$783,016.

Discontinuance Allowed.—The New Hampshire Public Service Commission recently authorized the Massachusetts

Northeastern Street Railway to discontinue service between Salem (N. H.), Pelham and Hudson and Taylor's Falls Bridge in Nashua. The award of the commission will permit the company to discontinue the service between Nashua and Lowell and Nashua and Lawrence. Fourteen miles of track are affected by the decision. The decision of the commission provides that the property shall be sold to the Nashua Street Railway or any other purchaser if the purchaser will pay as much for it as may be obtained by scrapping the road. In the petition to the commission by the Massachusetts Northeastern Company it was stated that the branch was not earning operating expenses.

Receiver Appointed.—An order placing the Alamance Railway, Burlington, N. C., in receiver's hands has been signed by Federal Judge E. Yates Webb upon petition of the American Trust Company of Richmond, Va. J. H. Bridges of Burlington is named receiver. The receivership is a result of defaulted payment of interest on \$120,000 in bonds held by the petitioner. The receiver is authorized to continue the operation of the line connecting Burlington, Graham and Haw River. The line is 8 miles long.

Power House Property Sold.—After many postponements, the power house property of the New York Railways at First Avenue and Ninety-fifth Street and the North River, New York, was sold on Jan. 2 in foreclosure proceedings to the New York Edison Company at the upset price of \$800,000. The sale must be confirmed by the court. The plant will eventually be modernized and used by the Edison company.

Committee on Consolidation Appointed.—Joseph Gilfillan and John J. Sullivan were appointed as a committee to represent the Union Traction Company in conferences to be held with the committee already appointed by the Philadelphia Rapid Transit Company and to be appointed by the Philadelphia Traction Company relative to the proposal for the consolidation of the street railway companies in Philadelphia. The meeting of Philadelphia Traction has been delayed, it is understood, due to slight illness of Joseph E. Widener. Recently Mr. Gilfillan, in a letter to the Philadelphia companies, pointed out that a plan looking to a simplification of the present corporate structure should be in the direction of a consolidated ownership of all lines in one corporation.

New Director Named.—Following a meeting of the Co-operative Welfare Association of the Philadelphia Rapid Transit Company, J. Morris Massey was unanimously chosen president for next year. By virtue of his office he will represent the employees on the company's directorate. Mr. Massey has worked for the Philadelphia company for the last twenty-eight years and is now a clerk in the Callowhill Street carhouse of the company. As head of the Welfare Association he succeeds Ralph R. Nyman.

Traffic and Transportation

Jitney Ordinance Unconstitutional

Regulatory Measure Enacted at Detroit, Long in Litigation, Ruled Against by Circuit Court

The jitney ordinance at Detroit was declared unconstitutional by Circuit Judge Ormond F. Hunt in a decision handed down on Dec. 29. The court also made permanent the injunction restraining the city and its officers from enforcing the ordinance. The court opinion stated that the ordinance was unreasonable from the viewpoint of public demand and general welfare, in excluding jitneys from the main streets and allowing other forms of transportation to use them, and that it was not a regulation but a prohibition of jitney service, which is inconsistent in view of the license granted by the ordinance. The jitney measure, intended to bar jitneys from the main traffic arteries, was passed by the City Council in May, 1922. It was to have become effective in the month of October, that year.

A NEW MEASURE PLANNED

It has been announced by Richard I. Lawson, Corporation Counsel for the city, that a new ordinance will be prepared for submission to the Council covering similar ground but intended to surmount the legal obstacles which the court has ruled exist in the 1922 measure. In view of the victory won in the court, Attorney Edward N. Barnard announced that the two jitney organizations, the Red Star Motor Drivers' Association and the Blue Ribbon Auto Drivers' Association, intend to buy 100 new cars at once and generally improve their service.

In reviewing the case it was cited that the ordinance was passed by the Council mainly at the request of James W. Inches, former Police Commissioner. The ordinance was approved by the old Council and it is believed that the popularity of the jitney has been proved to such an extent that the present Council is of different mind toward jitney transportation. Before the ordinance was put into effect the jitney drivers' association petitioned for an injunction restraining the city from enforcing the ordinance and a temporary injunction was granted by Circuit Judge Moynihan. Testimony on the petition for a permanent injunction was taken from June 5 to July 13 and from Sept. 24 to Nov. 2. About seventy-five witnesses were questioned. In the meantime the jitney drivers continued to operate under their 1922 licenses.

The court said that the jitney ordinance must be construed as reasonable or unreasonable, as related to the problem of transportation in its major and not in its minor aspects. In other

words, the question to be considered was: Would the enforcement of the ordinance as passed "promote the general welfare," the last phrase being quoted from the preamble to the Constitution of the United States?

The court recognized that the streets of Detroit, when they were laid out, were not designed to accommodate motor vehicle traffic, but said that only by the use of the surface by every known method of transportation could anything like an adequate and proper service be afforded. In other words, until Detroit had either a subway or an elevated line the general welfare demanded greater public service transportation facilities and not fewer.

In enacting the jitney ordinance the Council, so the court ruled, by implication of law, recognized the need of jitney service. Moreover, the need was confirmed by the testimony in the case.

The effect of the enforcement of the ordinance, excluding jitneys from the use of all the main arteries of travel, including parks and boulevards, would not be a regulation, but a prohibition of jitney service, a result not only inconsistent with the license granted therein, but unreasonable from the viewpoint of public demands and general welfare.

The court said that taking into consideration all the facts, circumstances and conditions of Detroit in relation to the demands for transportation, and the facilities for meeting that demand, the ordinance is in contravention of Section 28, Article 9 of the Constitution, which limits the authority and power of cities over their streets to "reasonable control."

DISCRIMINATION IS UNFAIR

It was held that the testimony showed that a seven-passenger automobile of standard model operated as a jitney was not in itself, or as operated, more dangerous than a motor vehicle privately operated. The court expressed the belief that to license buses and taxicabs to use all the streets, parks and boulevards, and at the same time exclude an ordinary automobile, called a jitney, from using the street, was discriminatory, class legislation and in contravention of Section 1, Article 2 of the Constitution of the State of Michigan, which provides:

"All political power is inherent in the people. Government is instituted for their equal benefit, security and protection."

Lower Fares in Effect.—The Des Moines City Railway accepted a fare of 7 cents from passengers on Dec. 27, a reduction of 1 cent over the rate in effect since Dec. 22, 1922. The points leading up to the fare cut were explained in the *ELECTRIC RAILWAY JOURNAL*, issue of Dec. 29.

Traffic Relief in Kansas City, Mo., Urged

The business men of Kansas City, Mo., are agitating for relief from the downtown congestion of traffic and for more convenient means for those people who live upon the boulevards to reach the shops. With 60,000 motor cars in the city a barricade of congestion has been thrown around the downtown business district. Parking rules are made and then remade. Still the traffic becomes more and more of a problem.

A committee has been appointed with J. Logan Jones as chairman, to make a survey of motor buses with the idea of introducing them in Kansas City, not only to relieve the congestion and to make the retail district more accessible to the shopper, but also to simplify crosstown travel. Mr. Jones has just returned from a trip east and is very enthusiastic about the idea of using the bus in Kansas City, not instead of the street car, but to work in conjunction with it, for he feels that in a city the size of Kansas City and doing the amount of business done there both the motor bus and the street car will be needed in order comfortably to handle the downtown crowds.

The business men feel that the street railway is the logical agency to operate the bus.

There are three types of bus service which Mr. Jones will outline to the business men of the Business District League:

1. A broad, comprehensive system of buses under a well-financed central management, covering the interurban territory in every direction in which good roads lead from Kansas City.
2. Intercity service between Kansas City, Mo., and Kansas City, Kan.
3. A Kansas City, Mo., service that would place buses on the boulevards and the main avenues.

It is anticipated that many people would patronize the bus who do not at present use the street car and are not likely to use the street car in the future. Most of these people either use their own motor car or else patronize the taxis.

It is felt by the business men that a broad plan of interurban, intercity and city bus lines would mean an increase by a third or a half of the shopping crowds in the retail district of Kansas City.

Jitneys Eliminated in Mobile

An ordinance adopted by the City Commissioners of Mobile, Ala., practically eliminates the jitneys from the streets. The ordinance was adopted Dec. 29. The vote on the adoption of the ordinance was two to one; Mayor Taylor and Commissioner Crawford voting for the ordinance and Commissioner Hartwell voting against it. The ordinance requires heavy indemnity bonds of the jitney owners. In fact these bonds are so heavy that it is said jitney owners will not be able to make them. Under the new ordinance the city will have the right to issue what will be known as "certificates of conveyance," under which buses can be

operated to sections not covered by street car lines of the Mobile Light & Railroad Company. In the opinion of the City Commissioners the streets of Mobile will soon be cleared of the jitneys under this new ordinance.

Theater Schedule Successful.—The Indianapolis & Cincinnati Traction Company has recently put into effect a theater schedule from Connersville, Rushville and any intervening point to Indianapolis at one fare for the round trip. It was first advertised that if the patronage were sufficient the reduced fares and train schedules would maintain throughout the theatrical season. The new ruling permits a passenger to board any car after 2:30 o'clock in the afternoon for Indianapolis, attend the theater and return on the cars leaving Indianapolis at 9 o'clock or 11 o'clock. Results attained under this arrangement have been very satisfactory to the railway management. These fares and train schedules will be maintained during the present theatrical season. The company's plan was referred to in the *ELECTRIC RAILWAY JOURNAL*, issue of Dec. 8.

New Ticket Fare in Effect.—The Tri-City Railway, Davenport, Iowa, is now selling tickets at the rate of fifteen for \$1. The new fare went into effect on Jan. 1.

Will Discuss Transportation Problems.—Residents of the Irvington district of Portland, Ore., will make a concerted effort to obtain transportation facilities contiguous to the new Grant High School. The nearest car line to the new school is now eleven blocks away. At a community meeting to be held Jan. 21, President Franklin T. Griffith of the Portland Railway, Light & Power Company will send a representative of the company to meet with the Irvington Club and discuss transportation problems.

Splendid Safety Record.—The Nashville Railway & Light Company, Nashville, Tenn., is very proud of its safety record. During the year 1923 there were six different days in which no accident of any character whatever occurred. This means that all cars on the twenty-one local lines were piloted through Nashville's congested thoroughfares a total of 90,000 miles without even a minor mishap. Statistics compiled by the company show that ten motormen and conductors on the Meridian Street line hold the record of operating 30,000 miles without an accident. These gratifying results are attributed by the company to the persistent and steady safety campaign which has been carried on among the employees.

Buses in Operation.—Six buses have been placed in operation along Bailey Avenue in Buffalo by the International Bus Corporation, a subsidiary of the International Railway. A 7-cent fare or four tokens for 25 cents with free transfers is charged.

Passes in Case for Gifts.—The Tacoma Railway & Power Company, Tacoma, Wash., in order to stimulate

the sale of its railway passes during the pre-Christmas period, placed on sale at various stores and theaters in Tacoma a leatherette pass holder, containing five certificates which are redeemable for weekly passes, and selling the case and certificates for \$5. The holder and passes were suggested as suitable Christmas gifts.

Will Start Bus Operation.—The Lewistown & Reedsville Electric Railway, Lewistown, Pa., will start a bus service early in January, buses being purchased to be used for city traffic and interurban traffic to act as feeders for the traction line. The buses will carry twenty-one passengers, the cars now being especially fitted for passenger service to the Grove City, Pa., factory. The bus fare will be 6 cents, with transfer privileges to the trolley cars.

Bus Line Absorbed by Railway.—The West Penn Company, Pittsburgh, Pa., has purchased the Marietta (Ohio) Bus Company and it will, under the West Penn operation, be known as the Pioneer Transport Company. The new company will start operating buses early this year. The Marietta Bus Company owned five buses, which will now become the property of the new company. It is planned to use three of these buses for operation in connection with the city railway lines for part of the route over which they are operated, but they will be so scheduled that they come in between the scheduled headway of the street cars. The present rate of fare charged on the buses is four tickets for 25 cents and 7 cents cash. The rate on the street cars is 7 cents cash without the use of any reduced fare ticket.

Legal Notes

NEW JERSEY—*Quasi Public Corporation Must Perform Duties to Public.*

Where a mandamus is sought in a court of law to compel a public utility corporation to perform its duty to the public, the court of chancery will enjoin the performance of that duty pending the suit at law. It is not a defense that the company cannot operate at a profit; that is not the test; the duty resting upon a quasi public corporation must be performed, or its privileges and franchises must be surrendered; it cannot discharge its duty on and off, as it may find it profitable to do so. If the company does not obey the mandate of the court a receiver may be appointed. Mandamus is the proper remedy to compel a street railway company to operate its road for the benefit of the public. [McCran, Atty. Gen., vs. Public Service Ry. Co., 122 Atlantic Rep., 205.]*

NEW YORK—*Where Pedestrian Was Clearly Negligent a Charge Referring to Possible Error of Judgment Held Inapplicable.*

Where the defendant requested a charge that, if the jury found that plaintiff stepped in front of defendant's street car when it was going 9 or 10 m.p.h. and when it was only 10 ft. away at a point not at a street crossing, she was guilty of contributory negligence as a matter of law, and their verdict must be for defendant, and the court in response to the request, charged the jury so to find if they found it was negligent for her to do it, it was error for the court to add that it was for the jury to say whether plaintiff's act in pausing momentarily on the rail was a negligent act or merely an error of judgment. In this case there was no place for excuse of

error of judgment. [Ford vs. New York City Interborough Ry. Co., 140 Northeast. Rep., 720.]

OHIO—*Warnings of Dangers of Automobile Traffic Not Necessary.*

It is not the duty of a conductor or motorman to warn passengers, upon leaving a street car at a regular stop, of the danger of automobile traffic in a city street, and failure to caution such passenger so will not render the company liable for injuries caused by an automobile passing the car at an excessive rate of speed, and striking the passenger after he had alighted from the street car in safety. [Reining vs. Northern Ohio Traction & Light Co., 140 Northeast. Rep., 84.]

MISSOURI—*Negligence of Passenger in Automobile. Action for Death of Wife.*

In a wife's action for injuries in a collision between a street car and an automobile driven by her husband, where there was evidence that she was sitting on the front seat and was fully conversant with all that occurred, and she testified as to the rate of speed at which the street car and the automobile were traveling, the court properly refused an instruction authorizing recovery, though she might not have exercised reasonable care, and properly told the jury that they must find she was exercising reasonable care.

Where the wife dies as the result of such injuries, the administrator cannot maintain an action for her death where she left a husband and minor children surviving her, but if the death was due to other causes than the injury, the administrator can bring action and recover the same damages which the wife could have recovered if she had lived. [Longan vs. Kansas City Railways, 153 Southwest. Rep. 758.]

*This decision was published in full in *ELECTRIC RAILWAY JOURNAL*, issue of Sept. 22, page 461.

Personal Items

Gordon Campbell Retires

Gordon Campbell, president of the York Railways, York, Pa., will retire on Jan. 14. Mr. Campbell came to York Sept. 1, 1908, as vice-president and general manager of the company. In January, 1910, he was made president.

Mr. Campbell expressed the warmest appreciation of the many evidences of fairness which the company has received at the hands of public officials, the press and the citizens of York, which have materially contributed to bringing about the present excellent railway, lighting and power and steam service to the public. He also commended to York in the highest terms the loyal and efficient staff of the company, to which he gives the credit for such measures of success as he has had in his management. He understands that the property will be managed by Day & Zimmermann of Philadelphia.

Under his management, the revenue of the railway company has grown from \$527,000 in 1908 to \$2,000,000 in 1923, railway receipts from \$388,000 to \$952,000 and the light and power and steam receipts from \$116,000 to \$983,000.

More than \$2,500,000 has been expended in improvements during Mr. Campbell's régime. All of York's railway lines have been reconstructed and new cars have been purchased.

He was graduated as mechanical engineer from Stevens Institute in 1886 and entered the railway field as a draftsman at the Denver shops of the Union Pacific Railway shortly thereafter. Subsequently he became superintendent of the Colfax Electric Railway, Denver; purchasing agent and master mechanic of the North Jersey Street Railway, Newark, N. J.; general superintendent of the railways in Providence, R. I., now operated by the United Electric Railways, and purchasing agent of the Washington Railway & Electric Company, Washington, D. C. This was followed by his connection in August, 1908, with the York Railways as vice-president and general manager, that position having been retained until he was promoted to the presidency of the York company. In June, 1918, he was elected president of the Pennsylvania Street Railway Association and served in that capacity for two years.

After a short rest Mr. Campbell proposes to devote himself to the study of public utility problems on a larger scale.

G. O. Nicolai has been appointed general manager of the Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company, succeeding E. M. Walker, who resigned recently to accept the presidency of the

Schenectady Railway. Mr. Nicolai was formerly superintendent of the light and power division of the Terre Haute Traction & Light Company.

Byron E. Bramble Appointed Comptroller of Illinois Property

Byron E. Bramble has been appointed comptroller of the Illinois Power & Light Corporation and the North American Light & Power Company, with headquarters at Chicago, according to an announcement made by William A. Baehr, vice-president and general manager of the company.

Mr. Bramble was born at Decatur, Ill. After leaving school his first posi-



B. E. Bramble

tion was in the capacity of meter reader and clerk in the employ of the Decatur Gas & Electric Company.

In 1904 the Decatur Gas & Electric Company became the property of the Illinois Traction Company and was one of the first public utility companies in Illinois taken over by the company, later to be known in Illinois as the McKinley system. In 1905 Mr. Bramble was transferred to the Champaign office of the company and became general auditor of the system. When the McKinley and Studebaker interests were merged in June, 1923, as the Illinois Power & Light Corporation. Mr. Bramble remained at Champaign as general auditor of the new corporation.

He is succeeded as auditor by his former first assistant, L. L. Campbell, Champaign, Ill.

C. P. Taylor, heretofore assistant superintendent of terminals at Norfolk, Va., for the Norfolk & Western Railway, has been appointed chief electrical engineer. He will be succeeded in his former position by B. L. Thompson.

Henry Grant with Tacoma Interurban

Henry Grant, superintendent for the Stone & Webster interests centering in Everett, Wash., has been promoted to the superintendency of the Tacoma interurban and allied lines, assuming his duties Jan. 1. Mr. Grant has been transportation head in Everett since May, 1919, upon his release from the U. S. Army service, in which he served as captain. During his service in Everett he supervised the transfer of the Everett traction lines from electric driven rail lines to motor buses. Mr. Grant will be succeeded by C. C. Coates, former assistant railway superintendent of the Stone & Webster interests in Everett.

C. C. Brown has been promoted from chief clerk of the accounting department of the New York State Railways at Rochester to the auditorship of the Utica-Oneida-Syracuse lines. In 1904 Mr. Brown entered the employ of the Rochester & Eastern as construction engineer. That same year he was appointed general freight and express agent, which position he held for about two years. In February, 1907, on the changing of the ownership of the road, he was placed in charge of the Canandaigua office, where he remained until 1909, when he was transferred to the Rochester office. In August, 1919, he was appointed chief clerk by J. M. Joel and has served in that capacity up until the time of his promotion on Dec. 1 of last year. His headquarters are at Utica.

Obituary

James Adkins, secretary and treasurer of the United Railways Company of St. Louis and its predecessors for the past thirty-three years, died on Dec. 25. For years he had the reputation of being the worker with the longest day at the United Railways headquarters. Mr. Adkins was seventy-two years old. In 1890 he became secretary and treasurer of the old Lindell Railway and continued in that position with the St. Louis Transit Company and later with the United Railways. He was also president of the United Railways Savings & Loan Association.

Edward Preston Usher, active in electrical invention in New England in the earlier days of the industry, died at Grafton, Mass., on Dec. 26. He was born at Lynn, Mass., in 1851, and about thirty years ago became president of the Milford & Hopedale Street Railway, where he invented a storage battery for street car propulsion which attained considerable success until its displacement by the overhead trolley system. His patents were later used in general storage battery manufacture and were sustained in prolonged litigation between the Brush Electric Company and the Hopedale Electric Company, the latter being formed to exploit the Usher apparatus.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Progress of Industrial Standardization

An appeal to manufacturers throughout the country to give more attention to the elimination of excess varieties during 1924 is contained in a pamphlet just issued by the Fabricated Production Department of the Chamber of Commerce of the United States. The department suggests that manufacturers who have not already done so undertake to simplify and standardize their products at the next inventory.

During the past year industrial standardization has continued to develop as one of the most active and important phases of American industry. Progress has been made in the standardization of raw materials, manufacturing processes and finished products. This is equally true whether looked at from the point of view of the factory, of the industrial or technical association or of a national movement. More than 150 undertakings now have official status before the American Engineering Standards Committee, the national clearing house for standardization. Fifty standards have received final approval by the committee, twenty-two of which were approved during 1923.

By the elimination of excess varieties which manufacturers are producing and carrying in stock the annual inventory can be more easily made.

Increased facility of inventory taking is only one of the manifold benefits and savings that accrue from a simplification and standardization project. For instance, such items as raw materials, purchased parts, component parts, finished product, cartons and packing cases are all amenable to the simplified practice treatment.

The dealer benefits through the reduced number of lines with their repair and accessory parts which he must carry in stock, the ultimate consumer finds the ready interchangeability of parts on his several machines of immense value and the supplier of raw materials experiences a substantial improvement in the facility with which his orders are processed and handled.

Large Increase in Copper Output

Smelter production of copper in 1923, as determined by the Department of the Interior from reports of the smelters showing the actual production for eleven months and the estimated production in December, was about 1,477,000,000 lb., compared with 950,000,000 lb. in 1922, an increase of slightly over 55 per cent. The smelter production of copper for December, as estimated by the producing companies,

was 132,000,000 lb., or at the rate of about 1,584,000,000 lb. a year.

Production of new refined copper from domestic sources was about 1,435,000,000 lb., compared with 905,000,000 lb. in 1922. In 1923 the production of new refined copper from domestic and foreign sources plus the imports of refined copper amounted to about 2,118,000,000 lb., compared with 1,359,000,000 lb. in 1922. In addition to the output of new refined copper about 130,000,000 lb. of secondary copper was produced at the refineries, compared with 146,000,000 lb. in 1922, so that the total output of refined copper was about 2,248,000,000 lb. in 1923 and 1,505,000,000 lb. in 1922.

Stocks of refined copper in the hands of domestic refineries on Dec. 31, 1923, as estimated by the refining companies, were about 256,000,000 lb., compared with 216,000,000 lb. on Dec. 31, 1922. The stocks of blister copper and material in process of refining, in the hands of the smelters, in transit to refineries and at refineries on Dec. 31, 1923, were estimated by smelting and refining companies at about 490,000,000 lb., compared with 361,000,000 lb. on Dec. 31, 1922. The quantity of primary refined copper withdrawn on domestic account in 1923 was about 1,305,000,000 lb., compared with 897,000,000 lb. in 1922.

Outlook for Business Good

BY JOHN F. OHMER

President Ohmer Fare Register Company, Dayton, Ohio

Industrial, financial and mercantile activities in the year of 1923, the fifth year after the World War, were without precedent. The production of our mines and forests was severely taxed to supply material for fabrication into commodities of every description. The requirements for steam and electric rolling stock taxed the capacity of car shops, and the automotive industry has had unlimited growth. No production has compared with the phenomenal increase in the number of vehicles manufactured last year. Notwithstanding the fact that more than four millions of automobiles were made and disposed of, the electric railway companies will show increased earnings.

The automobile has taught people to ride. Although it has congested the traffic in our cities to the point of intolerance, it is nevertheless certain that the well-managed electric railways and taxicab companies will profit by the automobile invasion.

Business apparently will continue good during 1924. The new business received by this company in 1923, the twenty-fifth year of its existence, has been the best in its history. Practically all expiring contracts were renewed for long terms, many of them by companies that have used Ohmer registers for more than twenty years. This mark of appreciation assures us that the successful manager realizes the importance of safeguarding that most important factor in his business—fare collection.

ELECTRIC RAILWAY MATERIAL PRICES—JAN. 2, 1923

Metals—New York

Copper, electrolytic, cents per lb.	12.875
Lead, cents per lb.	7.80
Nickel, cents per lb.	28.00
Zinc, cents per lb.	6.625
Tin, Straits, cents per lb.	47.25
Aluminum, 98 to 99 per cent, cents per lb.	26.00
Babbitt metal, warehouse, cents per lb.	
Fair grade.	52.00
Commercial.	25.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads.	\$4.675
Somerset mine run, Boston.	2.125
Pittsburgh mine run, Pittsburgh.	2.00
Franklin, Ill., screenings, Chicago.	1.875
Central, Ill., screenings, Chicago.	1.375
Kansas screenings, Kansas City.	2.00

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton.	\$43.00
Standard open hearth rails, gross ton.	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	\$3.10
Tie plates (flat type), cents per lb.	2.575
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.125
Steel bars, cents per lb.	2.40
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	\$1.70

Hardware—Pittsburgh

Wire nails, base per keg.	3.00
Sheet iron (28 gage), cents per lb.	3.75
Sheet iron, galvanized (28 gage), cents per lb.	4.90
Galvanized barbed wire, cents per lb.	3.80
Galvanized wire, ordinary, cents per lb.	2.75

Waste—New York

Waste, wool, cents per lb.	11.14
Waste, cotton (100 lb. bale), cents per lb.	
White.	14-18
Colored.	9-14

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	\$8.93
White lead (100 lb. keg), cents per lb.	11.37
Turpentine (bbl. lots), per gal.	\$0.925
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4-6

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	15.50
Rubber-covered wire, No. 14, per 1,000 ft.	\$6.65
Weatherproof wire base, cents per lb.	17.50

Paving Materials

Paving stone, granite, 4x8x4, f.o.b. Chicago, dressed, per sq. yd.	\$3.60
Common, per sq. yd.	3.20
Wood block paving 3 $\frac{1}{2}$ x 8 x 4, 16 treatment, N. Y., per sq. yd.	2.79
Paving brick 3 $\frac{1}{2}$ x 8 x 4, N. Y., per 1,000 in carload lots.	54.00
Crushed stone, 1-in., carload lots, N. Y., per cu. yd.	1.75
Cement, Chicago consumers' net prices, without bags.	2.10
Gravel, 1-in., cu. yd., f. o. b. N. Y.	2.00
Sand, cu. yd., N. Y.	1.25

Old Metals—New York and Chicago

Heavy copper, cents per lb.	11.25
Light copper, cents per lb.	9.50
Heavy brass, cents per lb.	6.00
Zinc, old scrap, cents per lb.	4.125
Yellow brass, cents per lb. (heavy).	6.00
Lead, cents per lb. (heavy).	6.75
Steel car axles, Chicago, net ton.	\$8.25
Old car wheels, Chicago, gross ton.	20.25
Rails (short), Chicago, gross ton.	19.75
Rails, (relaying), Chicago, gross ton.	33.50
Machine turnings, Chicago, net ton.	9.25

Receiver Appointed for Missouri Car Company

Circuit Judge Landwehr of St. Louis on Dec. 27 named R. Vernon Clark, East St. Louis, Ill., real estate dealer, receiver for the Missouri Car Company, organized in St. Louis two years ago to manufacture a non-rollicking street car truck. The plant in East St. Louis never produced a single truck, although much machinery and other equipment were installed for the making of the trucks, street cars and automobile bus bodies.

The suit for the receivership was instituted Dec. 26 to checkmate a foreclosure on the company's plant and real estate by the East St. Louis Cotton Seed Oil Company for default on a note for \$7,500 due last June 1, but extended to Dec. 15. The note was not paid on Dec. 15.

It is stated in the receivership petition that the company has assets appraised at \$300,000 and liabilities totaling \$175,000. The factory was purchased for \$75,000, of which \$16,000 has been paid. The company has agreed to the appointment of a receiver.

Officials of the company are said to contemplate a complete reorganization, but the legal controversies in which the company is now involved and the diversity of the interests affected, together with the uncertainty of lien priorities, made it difficult, without the aid of a receivership, to determine the rights of the various parties to pay off existing claims and to operate the plant. It is said the company has several offers to purchase its plant, patents and other assets.

Westinghouse Acquires New Building in Cleveland

The Cleveland branches of the Westinghouse Electric & Manufacturing Company and the Westinghouse Lamp Company have consolidated in one building their sales and service departments and their warehouses. The branches are now located in a new five-story building, called the Westinghouse Electric Building, on Ashland Road.

Contract Renewed

A contract for the lubrication of electric railway lines of the Brooklyn-Manhattan Transit Corporation and the New York Rapid Transit Corporation has been renewed with the Texas Company. This includes the supply of lubricants required for all surface, elevated and subway equipment of the entire system. The products furnished will provide for the lubrication of more than 112,000,000 car-miles yearly.

Rolling Stock

Mauch Chunk & Lehigh Traction Company, Mauch Chunk, Pa., recently suffered the loss of seventeen cars and a carhouse by fire. The damage approximates \$200,000.

Maumee Valley Railways & Light Company, Toledo, purchased in 1923 from the Cincinnati Car Company six cars. The cars were constructed for one-man operation and have been operated so far in that way with an extra boy or veteran to flag railroad crossings. The seating capacity of the cars is forty-four.

Lewistown & Reedsville Electric Railway, Lewistown, Pa., has announced the purchase of four new cars, costing \$60,000. The cars are equipped for train operation.

Evansville & Ohio Valley Railway, Evansville, Ind., is considering the purchase of ten new light-weight inter-urban passenger cars.

The Interborough Rapid Transit Company, New York, N. Y., has recently ordered from the General Electric Company 200 GE-260 motors and 100 PC-10 control equipments to be used on 100 new cars which the railway company has bought.

Wheeling Traction Company, Wheeling, W. Va., it is reported, is now securing bids for twenty-one new all-steel passenger cars. The cars are to be of the double-truck type and will have a seating capacity for about fifty passengers.

Track and Line

Baton Rouge Electric Railway, Baton Rouge, La., plans track and road improvement which will include reconstruction of the Florida Street line. Concrete foundation will be used and the street will be widened to accommodate the tracks and necessary roadway. The line known locally as the Dixie Railway extension will be completed about June 1, 1924.

Monongahela-West Penn Public Service Corporation, Parkersburg, W. Va., has plans under way for extensive traction line improvements, including the taking up of abandoned tracks, a general rebuilding of existing lines that are to continue in use, and it is expected shortly that new cars and modern equipment will be added.

Trade Notes

Clifford F. Rice of West Springfield, Mass., has ended forty years of service with the Wason Manufacturing Company, Springfield, now controlled by the J. G. Brill Company.

A. E. Tregenza has resigned from the position he has held for the past eleven years as general sales manager of the Economy Fuse & Manufacturing Company, Chicago.

Wason Manufacturing Company, Springfield, Mass., a subsidiary of the J. G. Brill Company, has announced changes in its personnel effective Jan. 1. A. H. Pease, formerly secretary, has been elected vice-president, succeeding Henry Pearson, who died recently. Charles F. Johnson will be general

manager; Walter Abrahams, secretary and clerk, and R. T. Foster, superintendent.

Owen D. Young, chairman of the board of directors of the General Electric Company and recently selected as a member from the United States of the reparations committee to help balance the German budget and stabilize the mark, sailed for Europe from New York on Dec. 29. Two Americans were invited to serve, the other being Gen. Charles G. Dawes, former director of the United States budget.

New Advertising Literature

Department of Commerce, Washington, D. C., has issued a new edition of the Bureau of Standards circular on electric service standards. The material contained in the old edition has been revised when necessary and brought up to date. This first edition has been the basis for many of the rules for electric service which are now in force in many of the states, and which cover such subjects as the accuracy of meters and means for testing them, interruptions to service, variations in voltage on electric lines, safety provisions, methods of metering, etc. These rules for the various states are embodied in the circular and recommendations are made for the framing of such rules where they do not already exist. In collecting this material the Bureau of Standards sent its experts all over the United States to confer with commissions and engineers having to do with the regulation of public utilities. The department has also issued the first number of "Commerce Yearbook," a new annual of the Bureau of Foreign and Domestic Commerce. This new book presents in 700 exceedingly readable pages of text and diagrams the outstanding factors in domestic and foreign commercial development for 1922 and early 1923.

Two-thirds of the volume is devoted to domestic commercial growth for 1922, analyzing each of the great industrial and financial groups as to its trade, production, price changes and market conditions, these being conveniently tabulated and analyzed in relation to one another so that their interdependence may be readily recognized. The balance of the book is a survey of foreign conditions, particularly those affecting American trade. An economic review and statistical abstract of each of these principal foreign markets is presented.

Johns - Pratt Company, Hartford, Conn., has issued a pamphlet, "Both Sides of the Story." It tells how both the central station's needs and the contractor's requirements are met perfectly by the Noark universal service switch.

General Welding & Equipment Company, Boston, Mass., has issued a pamphlet with photographs on the automatic cutting machine for locomotive, railroad, machine parts and plate work.

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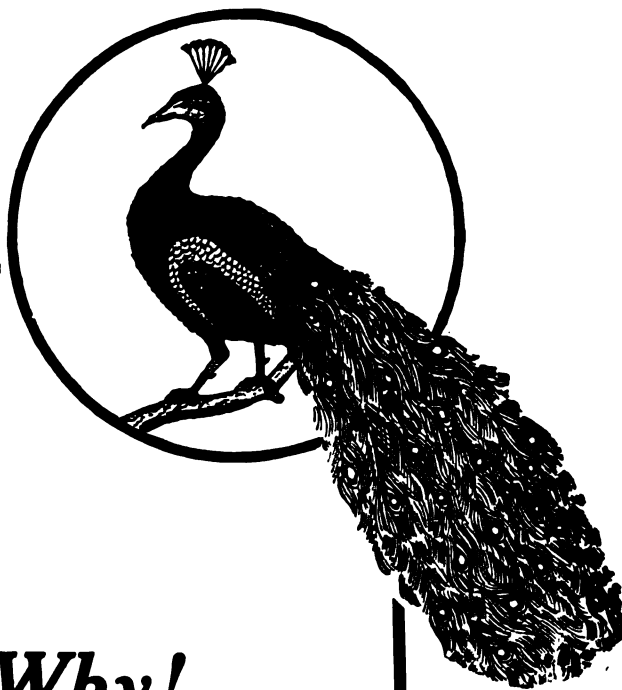
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This renewal percentage of the **ELECTRIC RAILWAY JOURNAL** subscribers is the highest of the fourteen McGraw-Hill publications, and is probably not equalled by any other magazine.

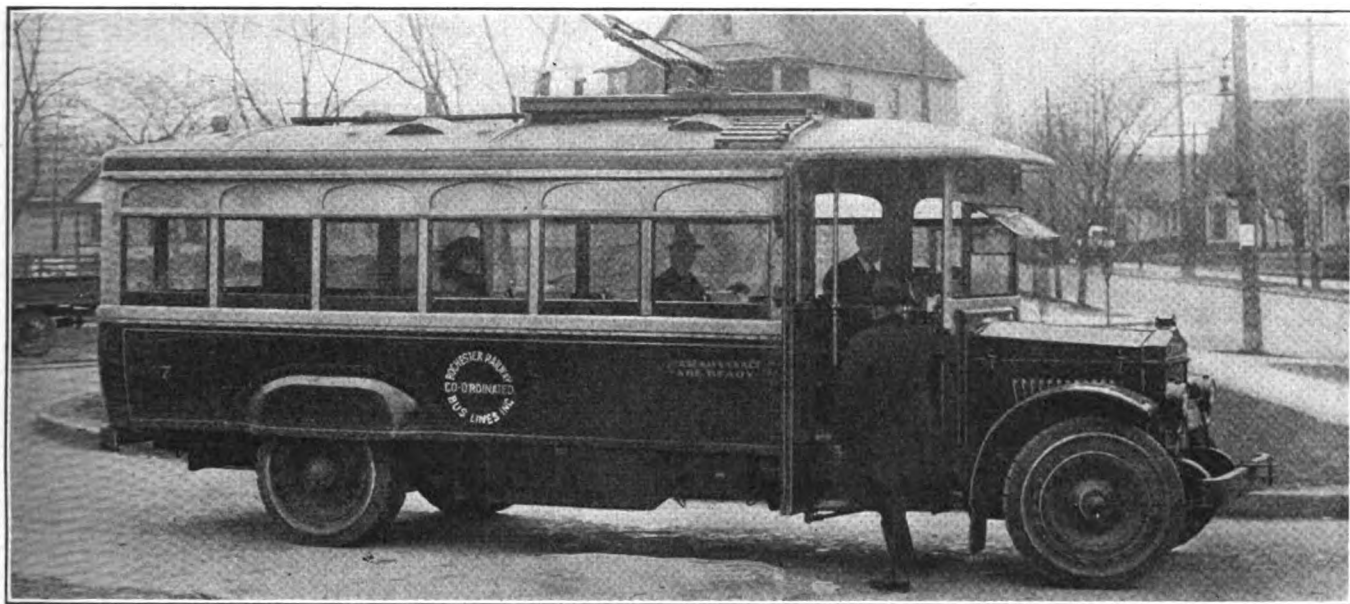
Such evidence of the high regard with which electric railway men hold this paper is indeed an inspiration to the editors and the publisher to keep on striving to make it a product of exceptional interest and practical value.

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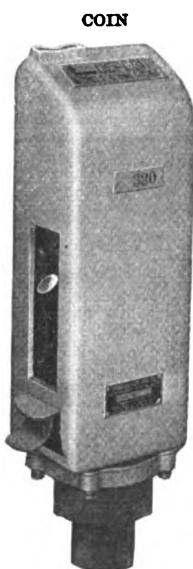
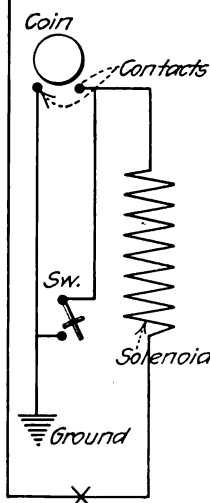
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Ravenswood, Chicago, Ill.

GREATER COMFORT—GREATER SAFETY—GREATER SPEED—GREATER PROFITS

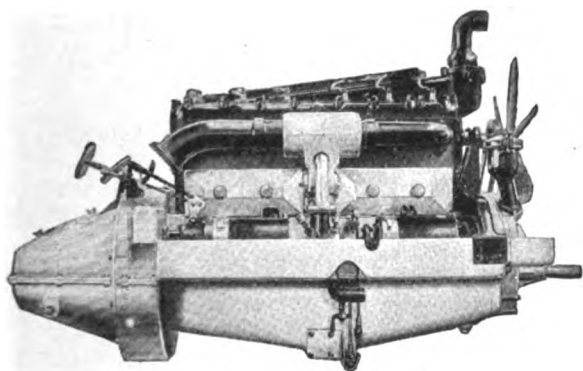
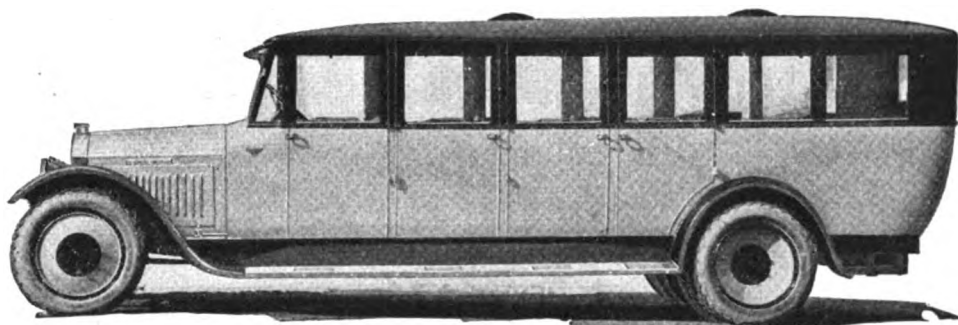
Investigate the Value of This Bus in Railway Extension or Feeder Service

Standard Chassis

\$4600

for 196-inch wheelbase, \$4750 for 220-inch wheelbase, at Buffalo. Including starter, battery, generator, solid tires (pneumatic tires optional at extra cost), electric lights and bumper.

Terms if Desired



The Pierce-Arrow 6-Cylinder Motor Bus Engine

The silent Dual-Valve, Dual Ignition Pierce-Arrow Bus Engine develops a maximum brake horsepower of 100 at 2500 revolutions per minute. It has a remarkable "getaway" and is so flexible that gear-shifting is reduced to a minimum.

The low-hung chassis has an unusually short turning radius. The chassis will accommodate any standard 25-passenger, pay-as-you-enter, wood or steel body, or the deluxe type body. Speed of from 45 to 50 miles an hour is easily maintained, if desired. In congested traffic, the engine will throttle down to an unusually slow pace in high gear and will accelerate powerfully. The bus is propelled by an inverted worm gear drive.

The modern Pierce-Arrow Bus is suited ideally for supplementing electric railway facilities.

It is produced by the maker of automotive products which, during the last 23 years, have established high standards of economy, reliability and durability.

Designed solely and especially for motor bus operation, the modern Pierce-Arrow Bus meets the four great demands of this specialized field—comfort, speed, safety and economy. It is not an adapted or converted truck; not an elongated passenger car.

We will gladly arrange a complete demonstration of the Six-cylinder Pierce-Arrow Motor Bus.

Write us, or communicate with the nearest Pierce-Arrow distributor.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo, N. Y.

Pierce—Arrow

79.5%

DURING the year just closed 79.5 per cent of the readers of the **ELECTRIC RAILWAY JOURNAL** have renewed their subscriptions. This is the measure used by the Audit Bureau of Circulations, and required in its reports, to indicate the value of a publication to its readers. It is a measure that can be gotten only when a paper has strictly a paid circulation.

This renewal percentage of the **ELECTRIC RAILWAY JOURNAL** subscribers is the highest of the fourteen McGraw-Hill publications, and is probably not equalled by any other magazine.

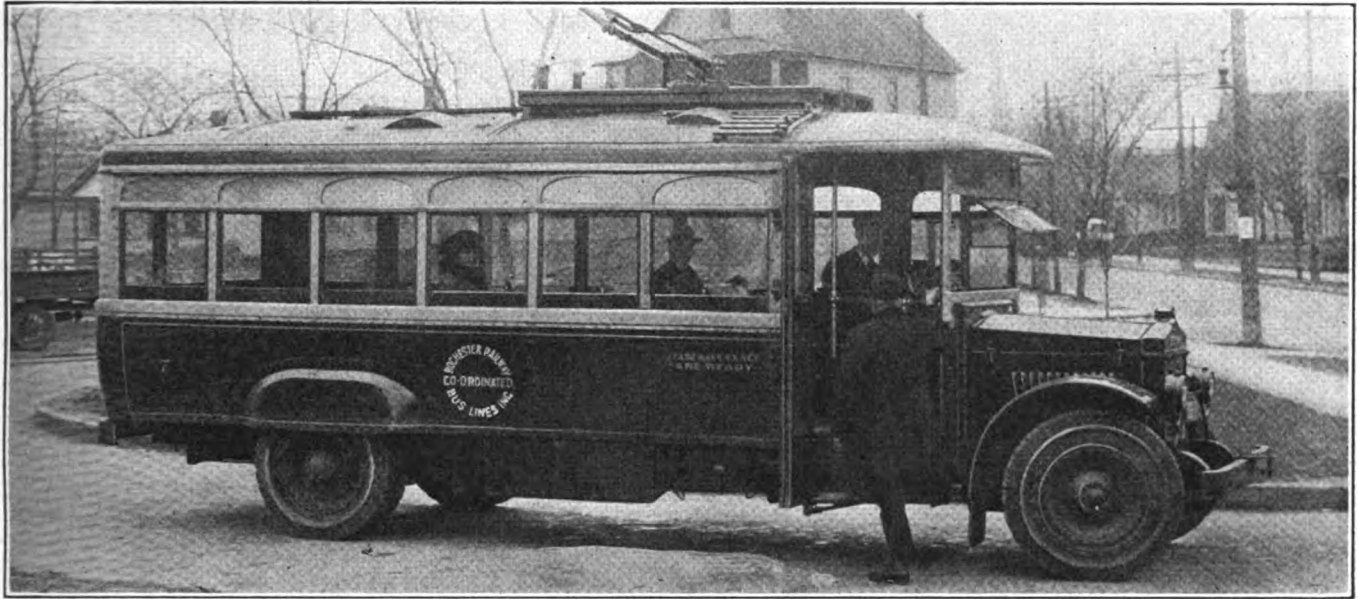
Such evidence of the high regard with which electric railway men hold this paper is indeed an inspiration to the editors and the publisher to keep on striving to make it a product of exceptional interest and practical value.

Electric Railway Journal

(A McGraw-Hill Publication)

10th Avenue at 36th Street, New York

The BROCKWAY TRACKLESS TROLLEY



*One of nine Brockway Trackless Trolley Cars operated by
New York State Railways, Rochester, N. Y.*

WE DO NOT CLAIM

The Brockway Trackless Trolley Car To Be
A Panacea
For All Transportation Ills

BUT WE DO CLAIM

That There Are Places In Practically Every Street
Railway System Where This Equipment Can
Be Used To Great Financial Advantage

Investigate

BROCKWAY MOTOR

Cortland



TRUCK CORPORATION

New York

Originators of low center of gravity transportation equipment

Trolley 400-600 Volts
+ D.C.

Solenoid



OVERHEAD

Instantaneous Registration!!

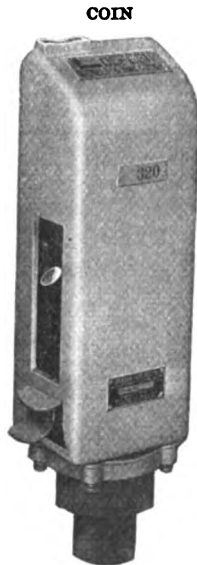
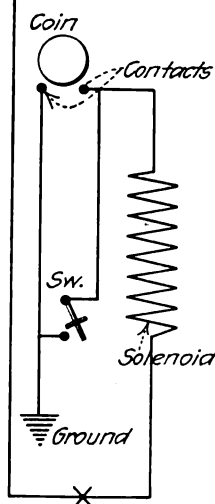
Our new system adapted to fare collection where the basic fare is either 5 or 10 cents.

Passenger depositing fare in slot instantaneously registers on overhead fare payment—the coin automatically does this electrically.

Conductor makes observation at slot or at inspection plate of coin deposited.

Company earnings shown on overhead register.

Inspection both visible and audible are part of this system occurring immediately with coin deposition.



these devices—the conductor's work is reduced to a minimum—he has access to the coin after registration for change making and car accounting is made at the source.

We Offer You Trial Installation

Johnson Fare Box Co.

Ravenswood, Chicago, Ill.

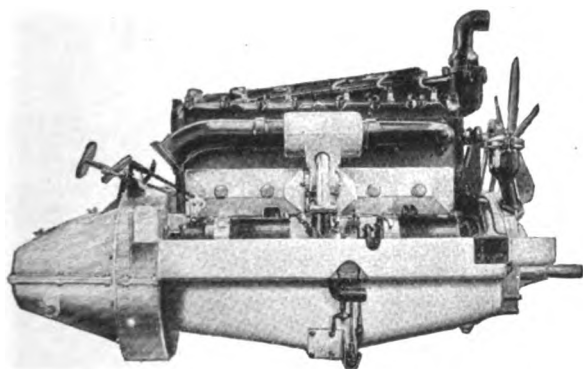
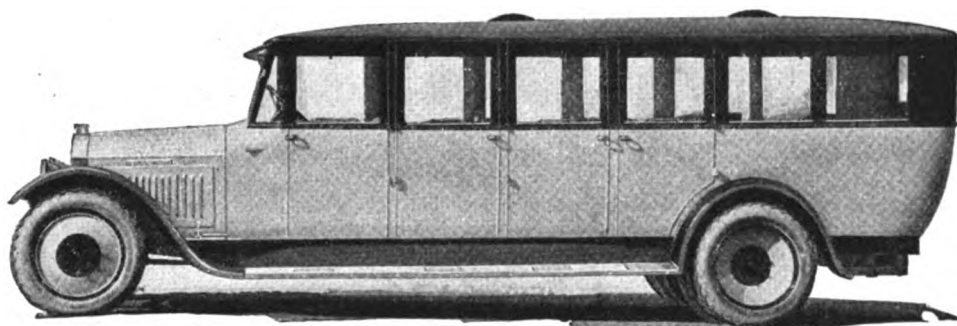
GREATER COMFORT—GREATER SAFETY—GREATER SPEED—GREATER PROFITS

Investigate the Value of This Bus in Railway Extension or Feeder Service

Standard Chassis
\$4600

for 196-inch wheelbase,
\$4750 for 220-inch
wheelbase, at Buffalo. In-
cluding starter, battery,
generator, solid tires
(pneumatic tires optional
at extra cost), electric
lights and bumper.

Terms if Desired



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Write us, or communicate with the nearest Pierce-Arrow distributor.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo, N. Y.

Pierce-Arrow



Western Light

A World Wide Organization of Cedar Pole Distributors

NPCo

This Brand Mark
on the butt of every
pole identifies and
guarantees it as
National Pole
quality.

The National Pole Company is handling the bulk of the cedar poles used for every purpose in the United States and all foreign countries.

To supply this demand and to provide a service that is unequalled in the entire cedar pole industry, this company operates, on a huge scale, its own pole cutting operations in the north and west.

Our photograph shows a panoramic picture of the Minneapolis Yard, where great stocks of poles are constantly carried. We also maintain extensive pole treating and concentrating yards at Everett, Wash.; Spokane, Wash.; and Sand Point, Idaho.

Concentrating and shipping yards at Vancouver, B. C.; Oakland, Calif.; Chicago, (Hawthorne), Ill.; Marinette, Wis., and Toledo, Ohio.

With our facilities and vast organization, this company is *always* in a position to start shipment, from its concentrating or distributing yards, the day your order is received.



Northern Light

Red Cedar

Durable and Strong



NATIONAL POLE COMPANY

General Offices: ESCANABA, MICHIGAN

TREATING PLANTS:

Minneapolis, Min. Sand Point, Idaho
Everett, Wash. Spokane, Wash.

CONCENTRATING and SHIPPING YARDS:

Vancouver, B. C. Oakland, Calif. Chicago, (Hawthorne), Ill.
Minneapolis, Minn. Spokane, Wash. Sand Point, Idah
Everett, Wash. Toledo, Ohio Marinette, Wis.

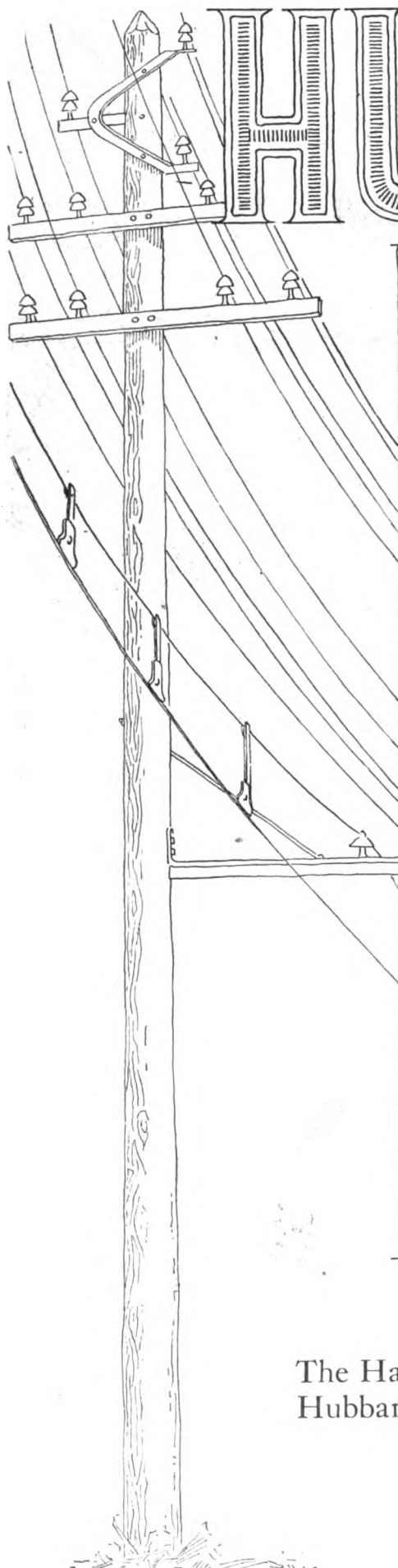
WESTERN ELECTRIC CO., INC., DISTRIBUTORS

Sales offices in 48 principal cities

White Cedar

Durable and Strong





HUBBARD

Line Hardware for the Electric Railway

Centralized
buying in
1924



Pole Band
with Pull off Rod



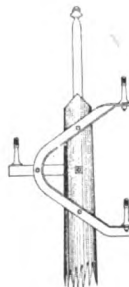
Split



Leading operators have found it a point of great convenience, that *all* of their line hardware requirements, special or standard, can be promptly met by Hubbard.

And it is a safe, buying plan, for Hubbard Line Material is made of new rolled open hearth steel having a tensile strength of 55,000 to 65,000 lbs. per sq. in. and is galvanized by the double hot dip process for utmost protection.

124 electrical jobbers throughout the United States carry Hubbard Line Material. There is one near you. Ask him.



Pierce Forged Steel Pins
Pierce Insulated Pole Bands
Hubbard Trolley Pole Bands
Hubbard Turnbuckles
Hubbard Pole Bands with
Pull off Rods.
Channel Arm Fixtures
Bo-arrow Arms
Steel Cross Arms
Drop Forged Eyebolts
etc., etc.

Hubbard & Company
Chicago—Pittsburgh

The Hardware *Makes* the Line
Hubbard makes *the* Hardware

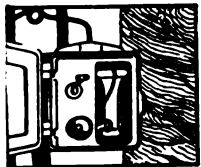


ROME WIRE

New!! Super Service Junior!



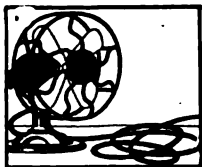
Lamp Cords



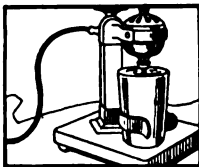
Telephones



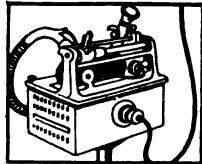
Washing Machines



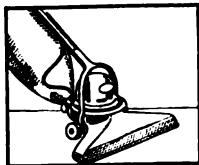
Electric Fans



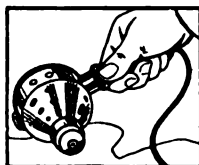
Fountain Service



Office Machines



Vacuum Cleaners



Vibrators



Put this new wire to work!

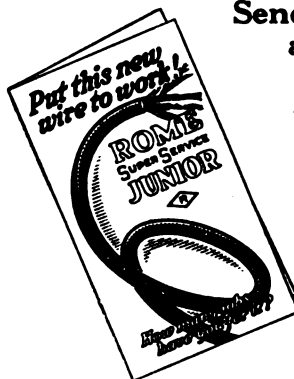
There is use for it everywhere in connection with railroad telephones, lamps and signal systems; in terminal barber shops for vibrators and hair dryers; on soda fountains for mixers and squeezers; in company hospitals for a dozen devices; for vacuum cleaners, sewing and washing machines; in the shops for fans and light tools; in offices for business appliances; in radio; for waiting room services, and so on down the list.

It gives real service in wet places, it is highly resistant to oil, grease and acid, it will stand up under constant battering and bending. It's the handiest wire you ever saw—strong as rawhide and so flexible you can tie knots in it, and as durable as it is attractive. How many jobs have you got for it?

Super Service Junior—No. 18—Two Conductor

Two conductors, each of forty-two number 34 B & S gauge bare copper wires, rope stranded for strength and flexibility, cotton wrapped, covered with 1-32-inch rubber 30 per cent insulation, twisted together with cotton cord fillers, then over all a heavy jacket of 60 per cent Super Service Rubber with an outside diameter of .295 inch, vulcanized in steel moulds under tons of pressure. Tensile strength, 160 lbs. Approved of course, by the Underwriters' Laboratories under Type SJ Cord. Put it to work—NOW!

Send for the Booklet
and a Sample



"Super Service"
Registered
in U. S.
Patent
Office



Write to Dept- B-2.

ROME WIRE COMPANY: Mills and Executive Offices: ROME, NEW YORK

Diamond Mill's: Buffalo, N. Y.
NEW YORK
50 Church St.

BOSTON
Little Bldg.

Branches:
LOS ANGELES
J. G. Pomeroy,
336 Azusa St.

CHICAGO
14 E. Jackson Blvd.

Atlantic Mills: Stamford, Conn.
DETROIT
25 Parsons St.

2155-L

WIRE=ROME

Carney

announces

The New Plant

B. J. Carney & Co., now being, we believe, the largest producers of Western Red Cedar in the Inland Empire, began in the sale of cedar poles in 1898, at Grinnell, Iowa. The producing office was established in 1900 at Spokane. At Sand Point, Idaho and later at Spokane, treating plants were built and yarding facilities increased.

During 1923, a new treating plant was built at Minneapolis with surrounding acreage for the storage of poles. Here we propose to maintain unusual stocks of standard poles—always available for prompt service, and in sufficient quantities to meet the most exacting demands.

Our new plant was in full operation December 1, 1923. This Minneapolis location is advantageous for obtaining continuous shipments from our producing centers in the west; and, with transit privileges, yarding and treating facilities, experienced men in yarding and treating, will give you reliable pole service.

Our new Minneapolis treating plant, as well as our other plants, has equipment to give butt treatment under any standard specification. Specifications A, AA, B, or Pentrex— $\frac{3}{8}$ -inch or $\frac{1}{2}$ -inch guaranteed penetration.

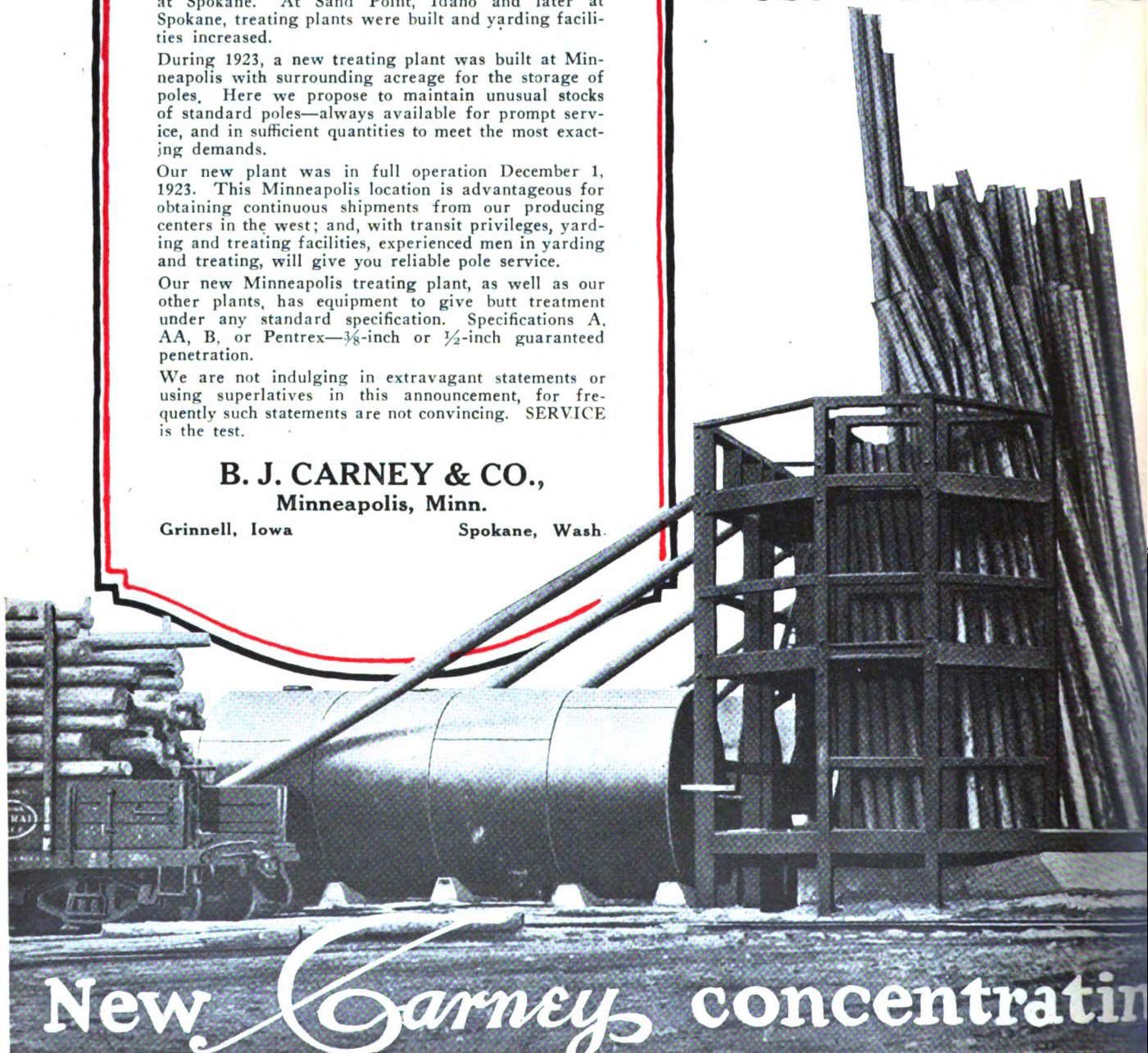
We are not indulging in extravagant statements or using superlatives in this announcement, for frequently such statements are not convincing. SERVICE is the test.

B. J. CARNEY & CO.,
Minneapolis, Minn.

Grinnell, Iowa

Spokane, Wash.

Larger ~ Better Pole Facilities



New Carney concentrator

Construction Progress at Minneapolis Plant



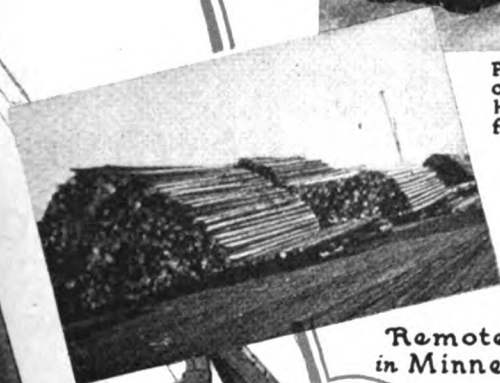
Spurs
into yard



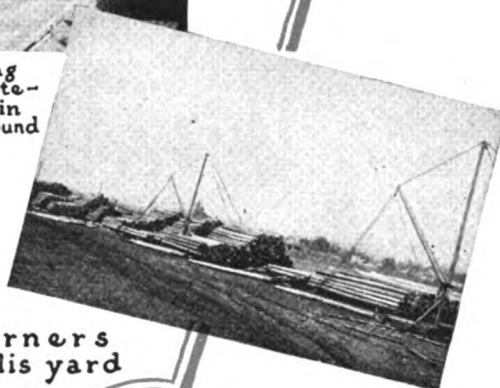
Ready to pour
concrete for
treating
tank



Pouring
concrete-
hoist in
foreground



Remote corners
in Minneapolis yard



and treating plant, Minneapolis

Bolt Fastenings

4

The 1923 Committee on Way Matters of the A.E.R.A. reported at the Atlantic City convention as follows:

"It was agreed that a substitute tie should meet the following requirements:

- | | | |
|--|---|---|
| 1. Resiliency. | → | The fundamental principle of the DAYTON RESILIENT TIE. |
| 2. Hold rail to gage. | → | Held securely by bolts accurately located in steel cross members. |
| 3. Provide sufficient bearing area. | → | By protecting the concrete from breaking or pulverizing, the Dayton Tie converts the entire roadbed into bearing surface. |
| 4. If expected to last for more than one set of rails, that easily renewable fastenings be provided. | → | Readily accessible bolt fastenings provide for rail renewal. |
| 5. Be easily installed by ordinary track workers. | → | Eight ordinary track laborers, by actual test, have laid 1,000 feet of Dayton Resilient track in a single day. |
| 6. Cost installed should be reasonable." | → | Dayton Resilient Tie Track costs \$2,000 per mile less than wood ties in gravel ballast. |

DAYTON

Provide for Rail Renewals

The fourth requirement the Way Committee agreed that a "substitute tie" should meet is that of *easy rail renewal*.

The Dayton Resilient Tie meets this requirement with readily accessible bolt fastenings. In case of a change in grade or a change in the height or base of rail, new blocks can be inserted without disturbing the foundation.

Thus, the fourth requirement of the Way Committee is simply met in the Dayton Resilient Tie.

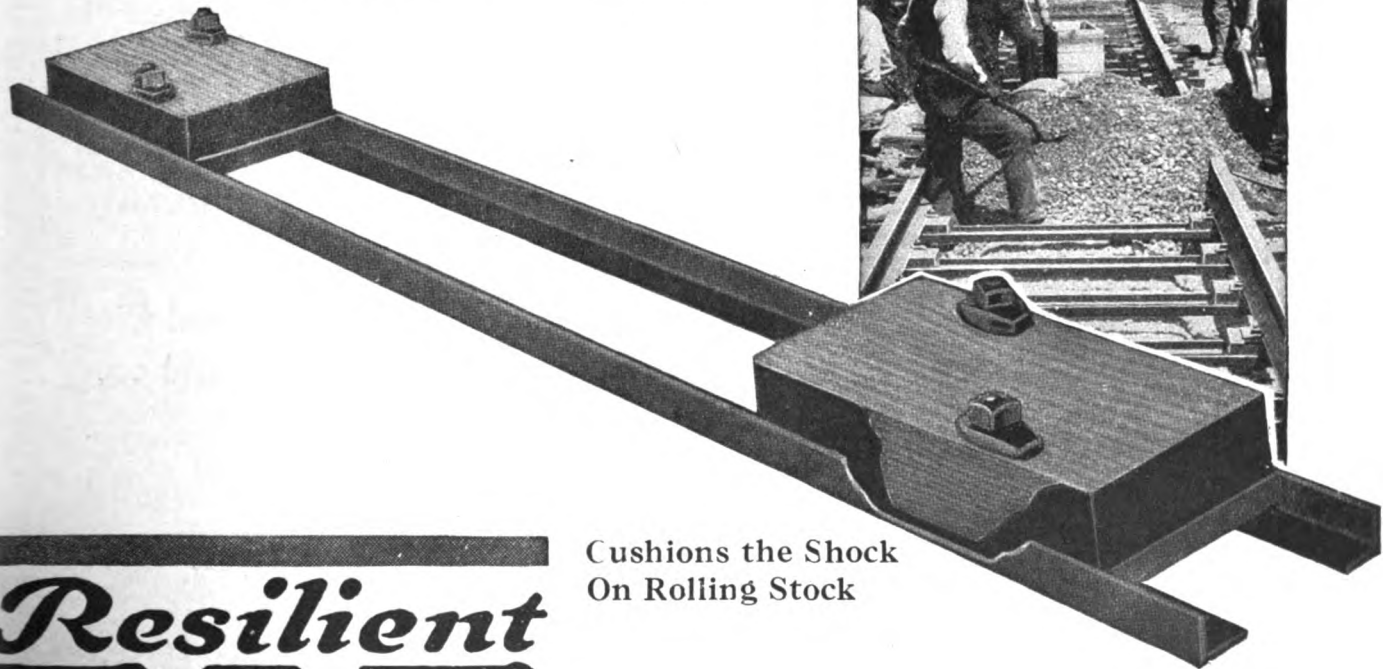
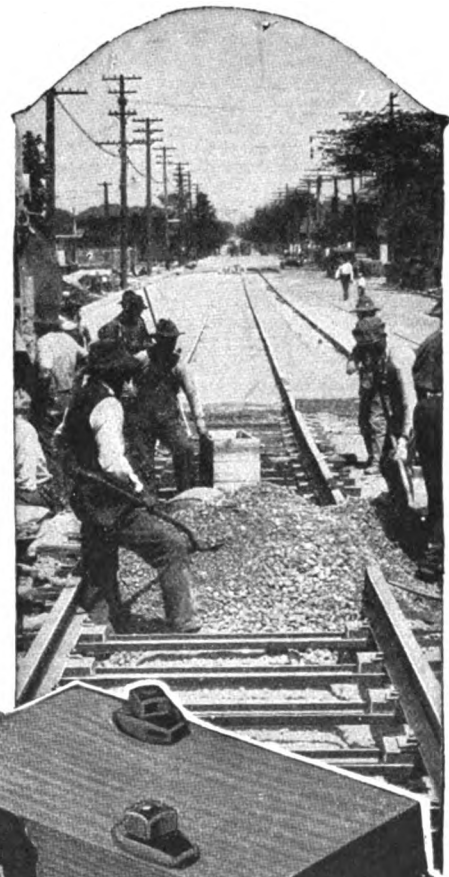
Track laid on Dayton Resilient Ties will last longer than any other construction known to date. But, naturally, no railway construction is everlasting. Therefore, it is encouraging to know that in seeking a tie to take the place of wood, you can get one that provides for easy rail renewal.

The Dayton Mechanical Tie Co.

707 Commercial Building, Dayton, Ohio

Canadian Representative:

Lyman Tube and Supply Co., Ltd., Montreal, Quebec



Cushions the Shock
On Rolling Stock

Resilient TIE

**Trolley Wheels
Bushings
Bearings
Section Insulators
Section Switches
Rail Bonds**

FLOOD CITY

Trolley Line Specialties

START the New Year by getting in contact with Flood City Trolley Line specialties.

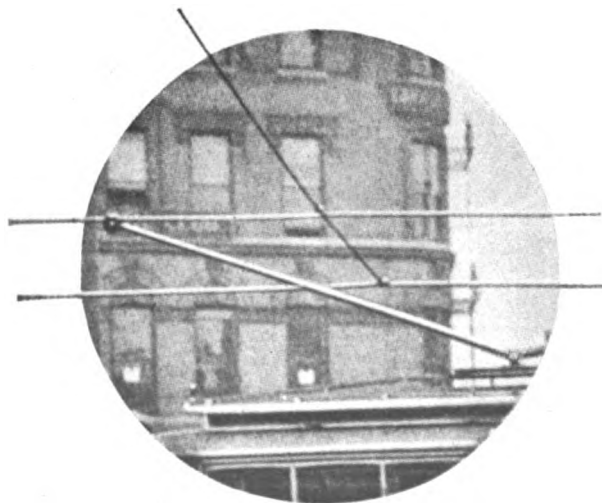
It will pay you to let us submit quotations on your 1924 requirements—first, because our large production enables us to fix most attractive prices, and second, because Flood City products will give unusually long and extremely satisfactory service.

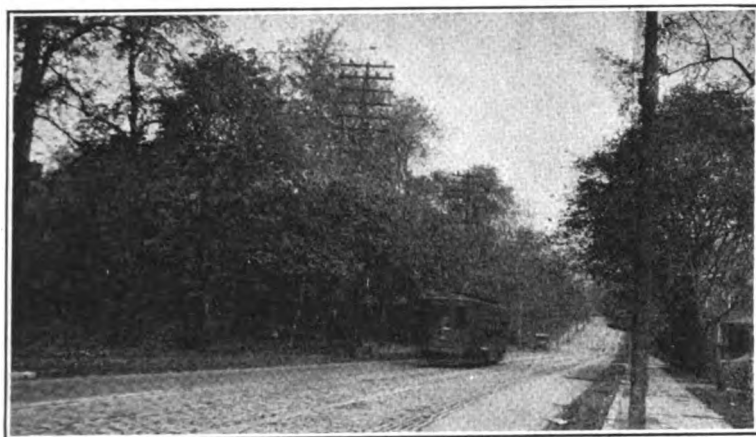
These two factors make Flood City Specialties most attractive and economical.

Write today

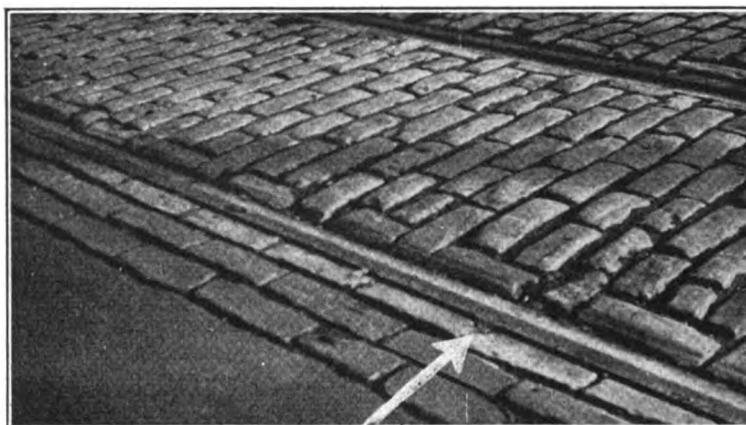
FLOOD CITY MFG. CO.

Johnstown, Pa.





Actual photographs of early joints made by the THERMIT Process on Shady Avenue, Pittsburgh, during the year 1912. These joints are still in service, showing no more wear today than is shown by the rail itself.



1912 to 1924

—and not a “cup” to
usher in the New Year

Each new year backs the Thermit Rail Weld with a new record of endurance

It's a long cry back to 1912, when the first THERMIT Insert Rail Welds were installed in Boston, Pittsburgh and Milwaukee. Yet so far, each new year has found these old joints still giving satisfactory service—they have not cupped or pounded; breakage has been negligible, and today, after 12 years, they show no more wear than the rail itself.

There's pretty convincing proof of the satisfactory service rendered by THERMIT Rail Welds, in the consistently increasing re-order figures of these and other pioneer users.

The Pittsburgh Railways Company have used THERMIT for over 400 miles of track and last year welded between 5,000 and 6,000 joints. The

Milwaukee Electric Railway & Light Co. purchased material for 5,000 welds in 1923; and the San Antonio Public Service Co., welding by the THERMIT process since 1913, have now approximately 15,000 welds in service.

We make bold claims for THERMIT Insert Rail Welds. We say that “first cost is last cost”; that final cost is infinitely lower than for less permanent methods; that maintenance is nil. But these facts become vital to you when they're backed by a decade or more of experience on the part of the most successful operators in the country. And remember that the initial cost of the THERMIT Rail Weld is no more on the average than that of any ordinary rail joint.

Write for our new and exhaustive Booklet “Thermit Rail Welding”

Metal & Thermit Corporation

120 Broadway, New York

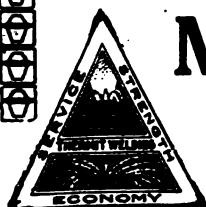
PITTSBURGH

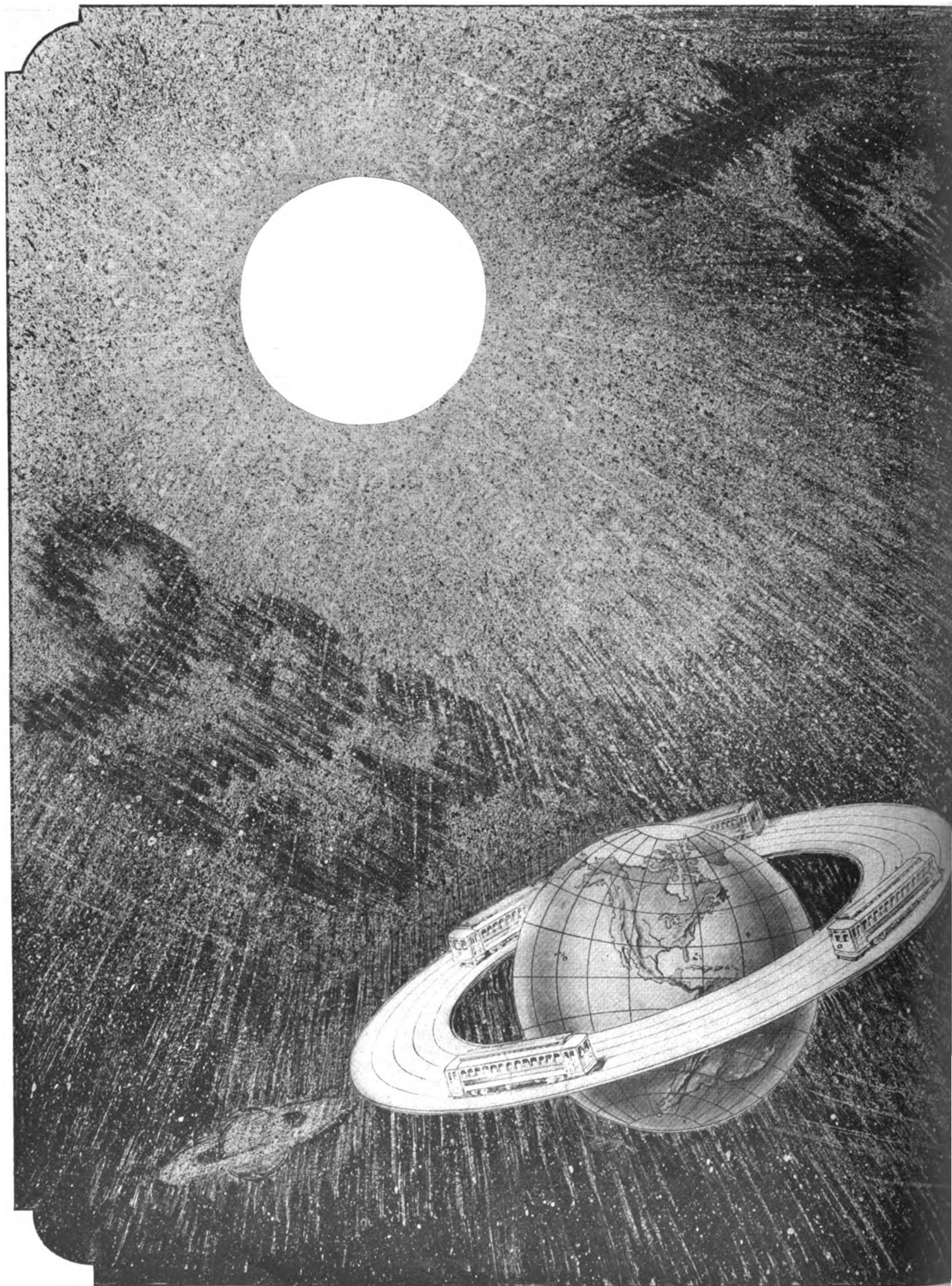
CHICAGO

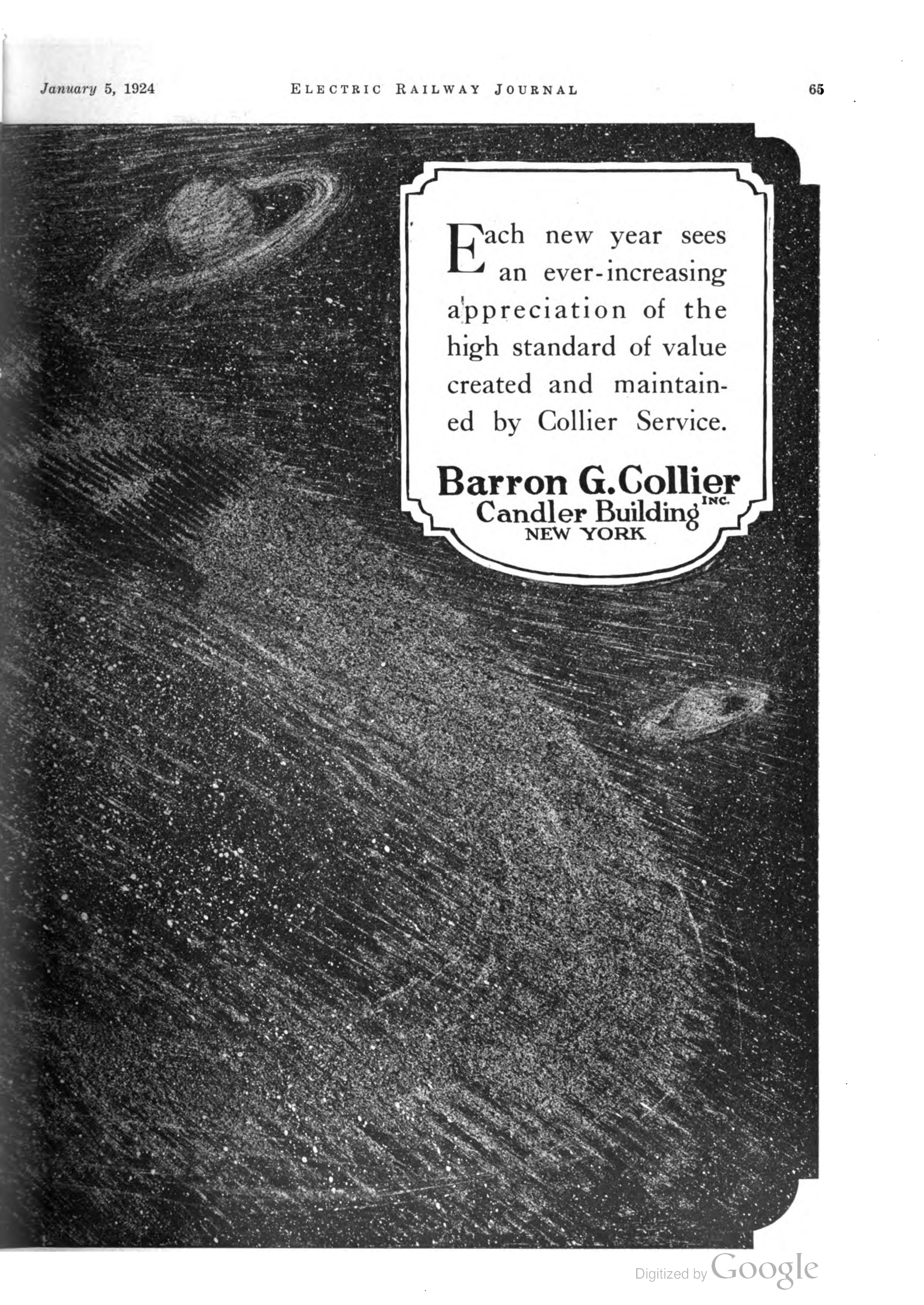
BOSTON

S. SAN FRANCISCO

TORONTO







Each new year sees
an ever-increasing
appreciation of the
high standard of value
created and maintained
by Collier Service.

Barron G. Collier
Candler Building^{INC.}
NEW YORK



Make Your Armatures Good for another ten years—

"Irv-O-Slot" insulation consists of a layer of varnished cambric and one or more layers of fibrous paper solidly cemented together. Thicknesses from 12 mils to 30 mils. Dielectric strength of from 500 to 700 volts per mil. Saves the time of the armature winder. No waste as strips are cut to your order.

Irvington Black Varnished Cambric

Irvington Black Varnished Cambric has a 30% higher dielectric strength, 100% better heat resistance, 100% more alkali and acid resistance, 200% Better Aging Qualities, 200% more resistance to oil than yellow varnished cambric. It is ideal for winding coils.

Dipping and Baking

Dipping with Irvington Varnish and then baking will make your armatures good for many years' additional service. Prepare now for the heavy overloads of winter time operation. Place that order today. Our nearest sales representative will be prompt in serving you.

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.

Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York	L. L. Fleig & Co., Chicago
T. C. White Electrical Supply Co., St. Louis	Consumers Rubber Co., Cleveland
E. M. Wolcott, Rochester	Clapp & LaMoree, Los Angeles
F. G. Scofield, Toronto	and San Francisco

A completely fireproofed plant

LARGEST MANUFACTURERS OF VARNISHED CAMBRIC IN THE WORLD



The Storm-test of Service

Five years of dependable service through varying temperatures, high winds, heavy snows, rain and thaws—such is the performance of 6,000,000 pounds of Anaconda Copper Trolley Wire, Feeder Cable and Signal Line Wire now in use on the Chicago, Milwaukee & St. Paul Rocky Mountain electrification.

For uninterrupted service specify Anaconda Copper Wire.

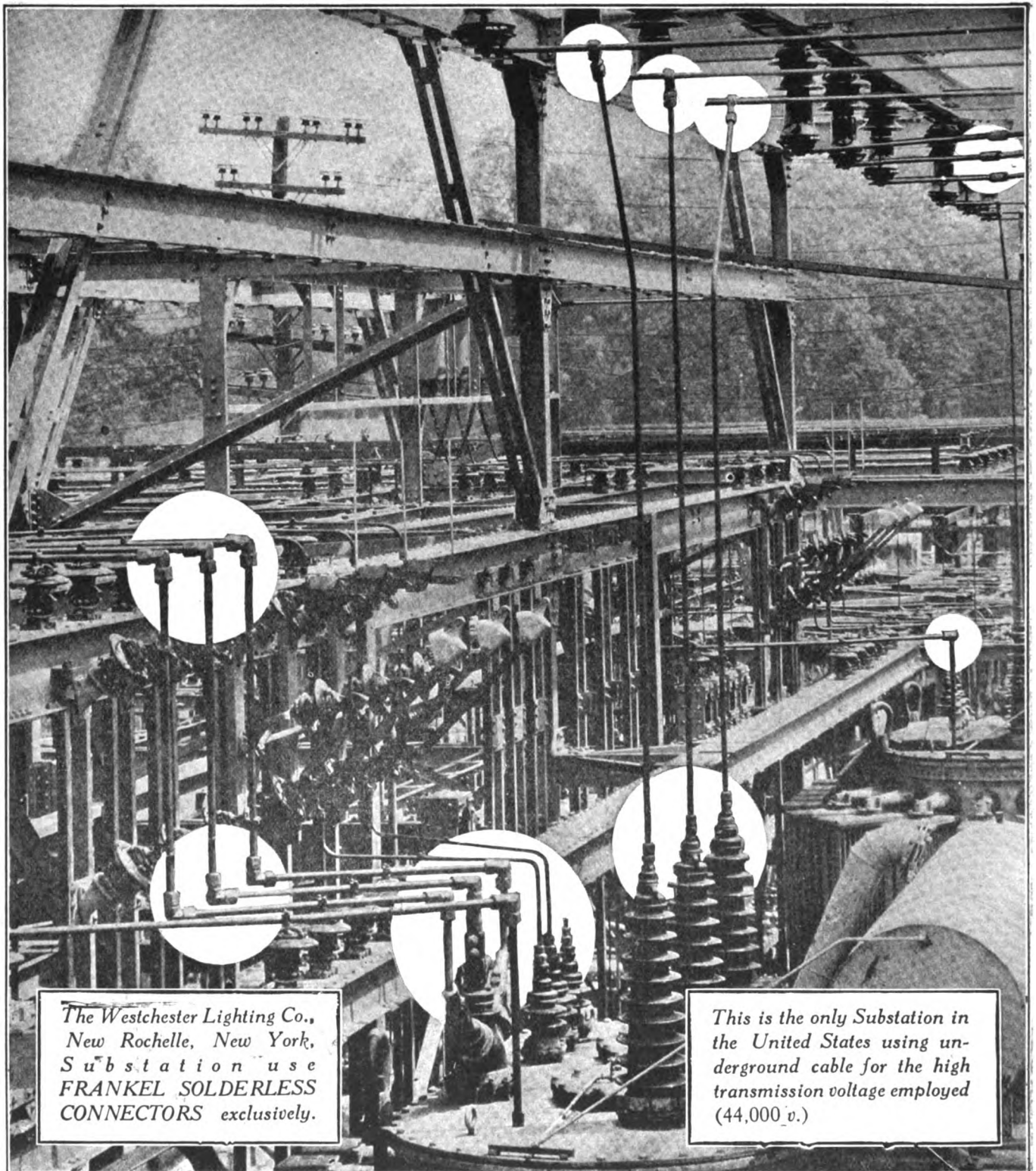
Anaconda
Copper Mining
Company
Rolling Mills Dept.
Chicago, Ill.



The
American Brass
Company
25 Broadway
New York

ANACONDA

TROLLEY WIRE



The Westchester Lighting Co.,
New Rochelle, New York,
Substation use
**FRANKEL SOLDERLESS
CONNECTORS** exclusively.

This is the only Substation in
the United States using un-
derground cable for the high
transmission voltage employed
(44,000 v.)

CONNECTIONS are made with **FRANKEL SOLDERLESS CONNECTORS** in a fraction of the time required for soldering joints. Tests and years of actual service have proven their superiority in conductance, non-heating qualities and tensile strength. No failure has ever been recorded against the **FRANKEL SOLDERLESS CONNECTOR** in any service.

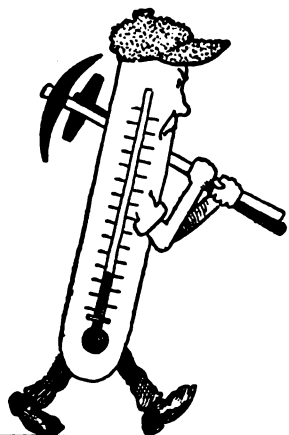
—DISTRIBUTORS—

Westinghouse Elec. & Mfg. Co.

Sales Offices in
all Principal Cities

Western Electric Company

Frankel "Solderless" Connectors



Old Man Temperature

(Foe of All Pavements)

leaves an A.B.C. Pavement unimpaired

BECAUSE a vitrified brick pavement with asphalt-filler is flexible, it has a give-and-take that leaves it unimpaired by temperature changes. It doesn't swell and buckle or soften and "roll" under summer suns, nor does winter's freezing of sub-grade moisture produce cracks and crevices through which surface water seeps with increasing damage. Frost doesn't scale its wearing surface.

These are a few of the reasons why vitrified brick is the ideal pavement for electric railway work twelve months each year the country over. Its years of service help pay dividends.

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION

ENGINEERS BLDG.

CLEVELAND, OHIO

*The A.B.C. of
Good Paving*

**Asphalt for
Filler.**

**Brick for
Surface.**

**Concrete,
Crushed Rock,
Crushed Slag
or Gravel for
Base.**

**VITRIFIED
Brick
PAVEMENTS
OUTLAST THE BONDS**

Albion Shale Brick Company
Albion, Ill.
Alton Brick Company
Alton, Ill.
Barr Clay Company
Streator, Ill.
Binghamton Brick Company
Binghamton, N. Y.
Cleveland Brick & Clay Company
Cleveland, Ohio
Clydesdale Brick & Stone Co.
Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co.
Coffeyville, Kans.
Collinwood Shale Brick Company
Cleveland, Ohio
Corry Brick & Tile Company
Corry, Pa.
Francis Vitric Brick Company
Boynnton, Okla.

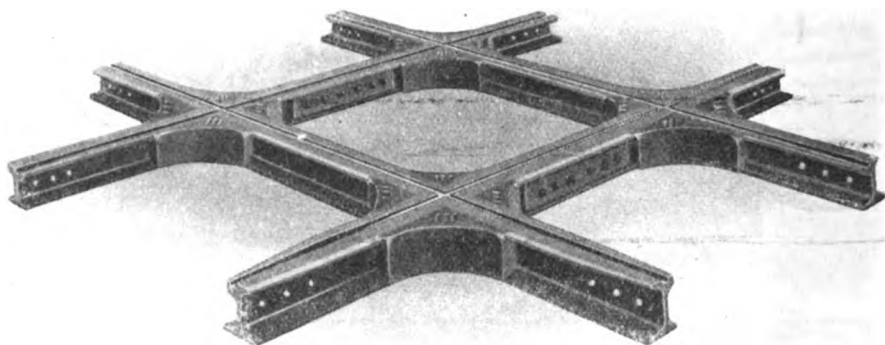
Georgia Vitrified Brick & Clay Co.
Augusta, Ga.
Globe Brick Company
East Liverpool, Ohio
Hammond Fire Brick Company
Fairmont, W. Va.
Hocking Valley Brick Company
Columbus, Ohio
Independence Paving Brick Co.
Independence, Kans.
Mack Mfg. Company
Wheeling, W. Va.
C. P. Mayer Brick Company
Bridgeville, Pa.
Medon Paving Brick Company
Cleveland, Ohio
Metropolis Paving Brick Co.
Pittsburg, Kans.
Metropolitan Paving Brick Co.
Canton, Ohio

Mineral Wells Paving Brick Co.
Mineral Wells, Texas
Moberly Paving Brick Company
Moberly, Mo.
Murphysboro Paving Brick Co.
Murphysboro, Ill.
Patton Clay Mfg. Company
Patton, Pa.
Peebles Paving Brick Company
Portsmouth, Ohio
Pittsburg Paving Brick Company
Pittsburg, Kansas
Purinton Paving Brick Company
Galesburg, Ill.
Southern Clay Mfg. Company
Chattanooga, Tenn.
Springfield Paving Brick Company
Springfield, Ill.

Sterling Brick Company
Olean, N. Y.
Streator Clay Mfg. Company
Streator, Ill.
Thornton Fire Brick Company
Clarksburg, W. Va.
Thurber Brick Company
Ft. Worth, Texas
Toronto Fire Clay Company
Toronto, Ohio
Trinidad Brick & Tile Company
Trinidad, Colo.
Veederburg Paver Company
Veederburg, Ind.
Western Shale Products Company
Fort Scott, Kans.
Westport Paving Brick Company
Baltimore, Md.

For Electric Railway Service—

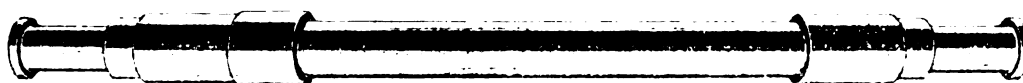
Bethlehem Rolled Steel Alloy Crossing, Design 960, is made of a special rolled Mayari chrome-nickel steel rail and is recommended for heaviest traffic. The head of the rail is rolled full, the flangeway machined to any desired depth and then heat-treated to withstand wear.



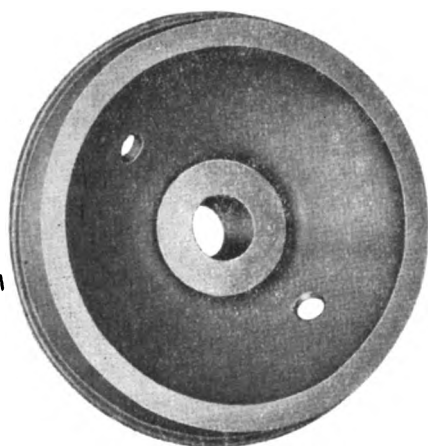
The rails are iron bound into one solid piece, flange bearing throughout, and made continuous in one track.

restored by either the electric or oxy-acetylene welding process after wear has developed. This design is also used for mates and frogs.

Design 960 Crossing may be welded or



Cambria Axles are manufactured in a plant specially equipped for this purpose. Electric railway products of the Bethlehem Axle Plant at Johnstown, Pa., include street, interurban, subway, and elevated car axles, and armature shafts for electric service.



Cambria Wheels are made the modern way by a combination rolling and forging process. Great care is taken in the selection of proper grades of material, and with the use of modern equipment, these wheels undergo exceptional refinement of structure.

Newly added storage facilities at Cambria Plant, Johnstown, Pa., enable Bethlehem to carry a large stock of wheels in standard sizes, assuring prompt shipment.

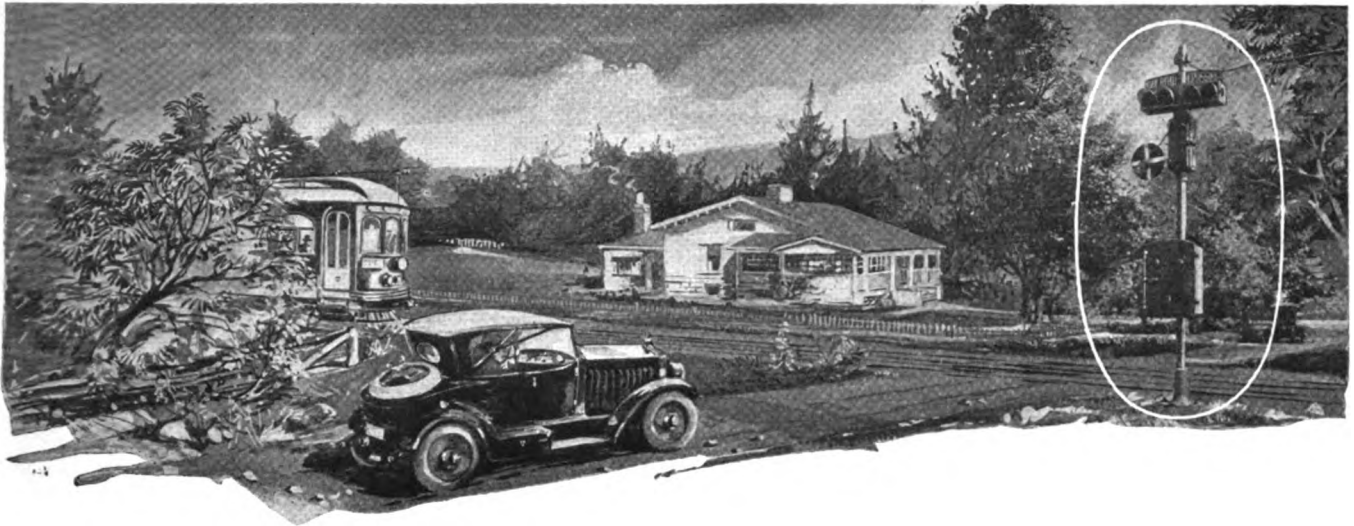
Other Bethlehem Products for the electric railway field include: **Girder Rails, Tee Rails, Special Trackwork, Splice Bars, Bolts, Nuts, Spikes, Tie Plates, Tie Rods, Gear Blanks, Couplings, and Pole Line Material.**

BETHLEHEM STEEL COMPANY, General Offices: BETHLEHEM, PA.

Sales Offices:
 New York Buffalo Boston Cleveland Philadelphia Detroit Baltimore Cincinnati Washington Chicago St. Louis Atlanta Pittsburgh
 Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM

Products for Electric Railways



***“Deaf”
“Dumb”
or “Blind”***

Still he can't miss this DANGER Signal —

**It Flashes
It Rings
It even Wigwags**

He may be a reckless racer. Perhaps the racket of his own “flivver” is enough to drown the sound of a church bell. Maybe the glare of another head-light obscures the warning lights. Or he just may be as “dumb” as they make them.

BUT—he can't miss—or mistake—the three-fold warning of a Nachod Highway Crossing Signal. It is as startling as a steam siren, and as insistent as a Big Ben clock—a sure safeguard against the enormous costs of crossing crashes.

NACHOD
SPELLS SAFETY

Highway Crossing Signals
Headway Recorders
Automatic Block Signals

Nachod Signal Company, Inc.
Louisville, Ky.

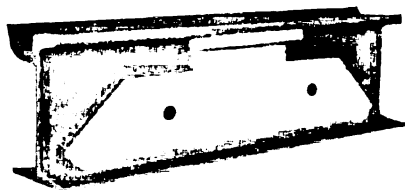
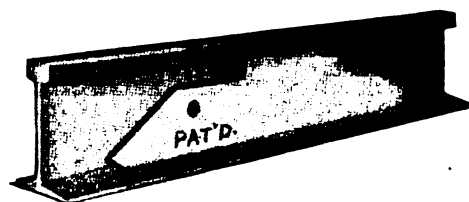
Bell and Wig Wag Crossing Signal on Milwaukee Electric Railway & Light Company's Line, Milwaukee, Wis.



Report of Investigation of
“INDIANAPOLIS”
 Type of Welded Rail Joints
They Meet All Requirements

To Wit as Follows:

1. **Conductivity**—138%—United States Bureau of Standard Test.
2. **Strength**—Over 100% — Robert W. Hunt & Co., Testing Laboratories.
3. **Endurance**—11 years in Service—Still Intact.
4. **Dependable**—Less than 1% Failure. When installed as directed by manufacturer.
5. **Economical**—Cost Less Than Bolted and Bonded Joints.
6. **Available**—Any road. Any quantity —from One (1) to Ten Thousand (10,000).
7. **Universal**—In use on over 125 Different Rail Sections.
8. **Endorsed**—In use on over 200 properties.



WHY?

Because —

They are Scientifically Designed
 A Special Product for a
 Specific Purpose

Completely and Perfectly Effecting the
“CONTINUOUS RAIL”

*“Perfection in Principle Proven
 in Performance”*

The Indianapolis Switch & Frog Co.

SPRINGFIELD, OHIO

J. J. Costello

Boston, Mass.

New England Representative

Long-Bell

Creosoted Yellow Pine Poles



STRONG and enduring, Long-Bell Creosoted Yellow Pine Poles insure maximum service at less cost per year. In addition to their filling every practical need, these straight, sturdy poles of quality give a spick-and-span, well-kept appearance to the right-of-way. Traffic interruptions due to pole failures are eliminated.

Long-Bell Poles are made resistant to decay and fire by treating, full length, with the best grade English Creosote Oil. The pressure-vacuum process of creosoting is employed.

As evidence of our confidence in these poles and to identify their quality, each pole is branded "Long-Bell" five feet above the ground line. Letters below trademark show plant and year of treatment.

*Further Information and Prices
will be gladly sent on request*

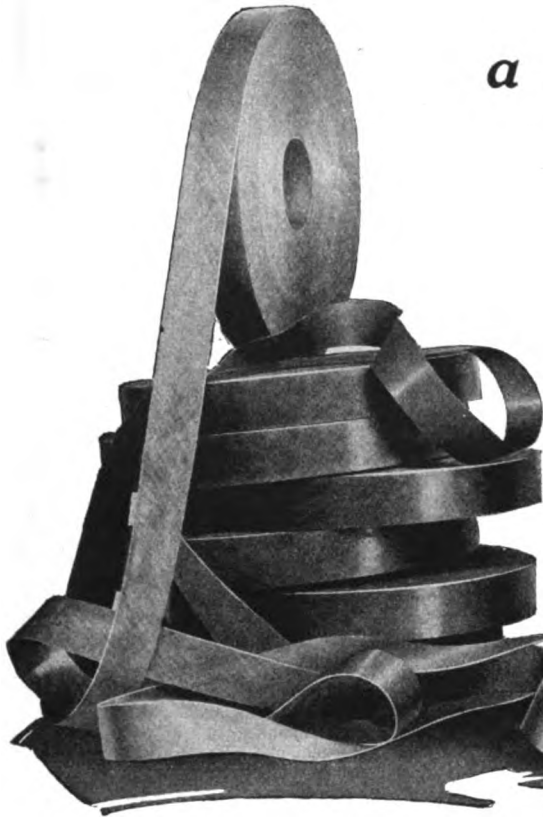
The Long-Bell Lumber Company

1244 R. A. Long Building Kansas City, Mo.

Creosoted Yellow Pine Poles; Highway Guard
Rails and Fence Posts; Ties, Timbers,
Lumber, Piling and Wood Blocks

*Photograph shows Long-Bell Creosoted
Yellow Pine Poles of the Indiana Ser-
vice Corporation between Fort Wayne
and Huntington, Indiana*

EMPIRE BIAS CUT SEAMLESS TAPE



a new  product that will
save you time and money!

Here is the new EMPIRE varnished cambric tape that is bias cut and seamless! It provides all the advantages of the regular impregnated bias tape, and in addition it is free from the limitations and drawbacks of the old-style stitched seam.

It is absolutely the same thickness at all points because there are no seams!



The Better Tape for Armature Coils, Repair Work, Cable Splicing, Bus Protection, High Tension Work

Empire Bias Cut Seamless Tape ensures a smooth, uniformly protected insulating job; and every inch of it is usable and can be hand or machine applied.

It saves money by eliminating the time lost in cutting out sewed seams which occur every 52 inches in sewed bias tape, and the considerable amount of

tape that is wasted in cutting. It eliminates the short circuits that occur due to the failure of such seams as are left in and form weak spots that eventually break down. It saves you time and money both in application and in service and gives you a better job, either hand or machine applied.

SUPERIOR FOR TAPING MACHINES

Empire Seamless Bias Tape is much superior to the old sewed seam tape for machine taping and it eliminates the plain woven tapes by doing away with the need for impregnation. It saves time, occupies less space, and gives you a neat, complete, finished job in one operation! Special diameter rolls for taping machines furnished.

Send to our nearest office for data and quotations on your insulation requirements, and for test samples and full information. Our Engineering Department is at your disposal for suggestions and recommendations.

MICA INSULATOR COMPANY

68 Church Street, New York

542 So. Dearborn Street, Chicago

Victoriaville, Canada

Works: Schenectady, N. Y.

AGENTS

G. A. MORRELL

516 Caxton Bldg., Cleveland, Ohio
THE MONROE BRASS & WIRE CO.
804 Traction Bldg., Cincinnati, Ohio

W. A. BITTNER CO.

422 First Avenue Pittsburgh, Pa.
W. E. SPITTLER
38 Chardon Street, Boston, Mass.

THE ELECTRICAL SPECIALTY CO., Inc.
75 Fremont Street, San Francisco, Cal.
THE ELECTRICAL SPECIALTY CO., Inc.
411 South Main Street, Los Angeles, Cal.
2034-F



ALUMINUM CONDUIT

To save weight and trouble: Aluminum weighs about one-third as much as ordinary commercial metals. If 100 pounds of aluminum is used, a saving of roughly 200 pounds is accomplished.

Aluminum resists many of the common corrosive agents: moist air, sulphur fumes, organic acids, etc.

Aluminum conduit gives long service and saves weight. Tubing (for air-lines) and other varieties of fabricated aluminum helps in giving long life to the modern lightweight cars.

Mail the attached coupon if you are interested in weight saving, through the use of aluminum conduit, tubing, castings sheet, etc.

Aluminum Company of America
Pittsburgh, Pennsylvania

OFFICES

Albany	New Haven
Boston	Newark
Buffalo	New York
Chicago	Philadelphia
Cleveland	Pittsburgh
Dayton	San Francisco
Detroit	St. Louis
Indianapolis	Washington, D. C.
Kansas City	Export Sales
Minneapolis	New York

Aluminum Company of America

Gentlemen:

I am interested in aluminum for.

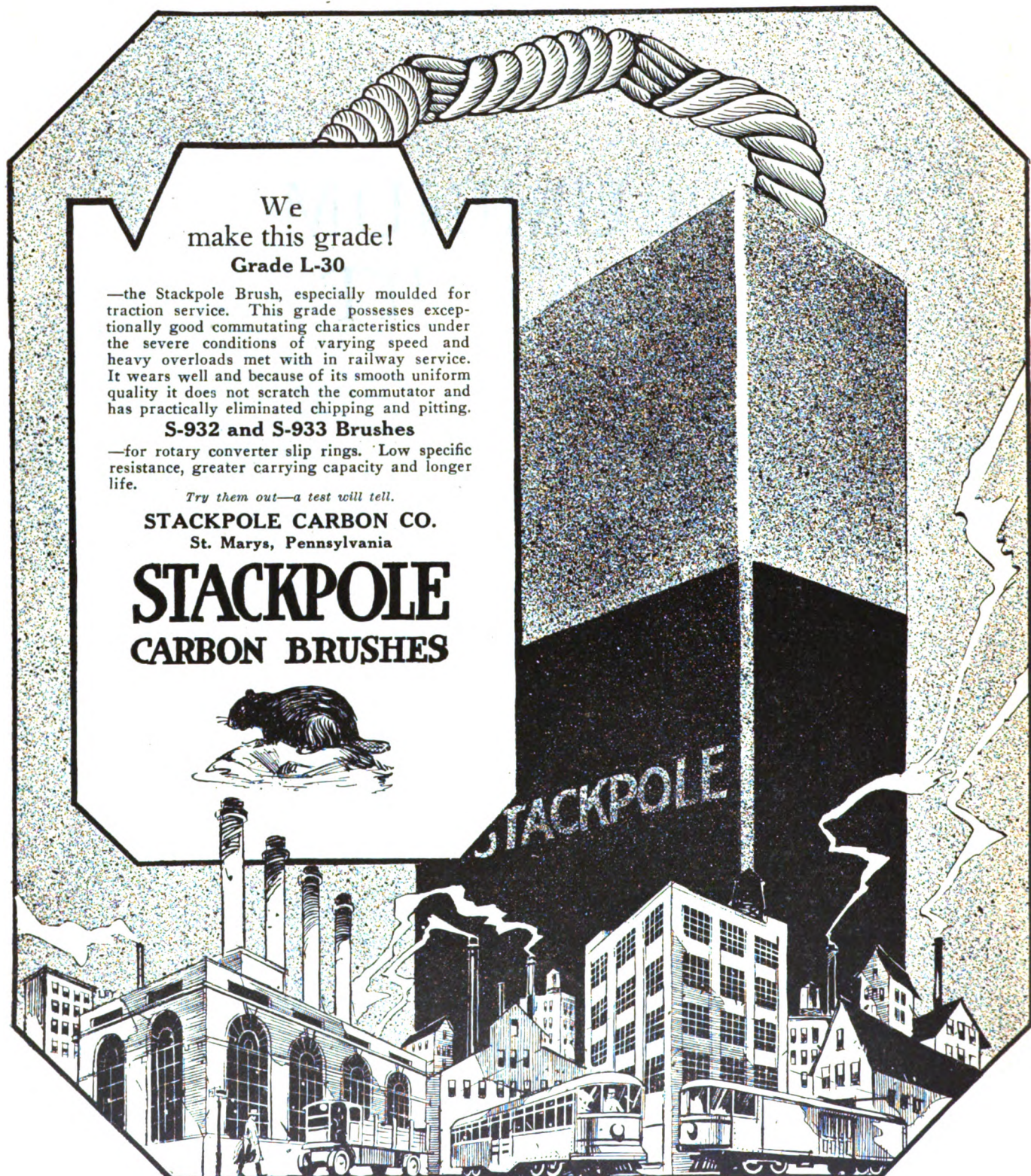
Please send ☐ Representative.

☐ Information.

☐ Sample.

W.

Please mail Coupon to nearest office.



We
make this grade!
Grade L-30

—the Stackpole Brush, especially moulded for traction service. This grade possesses exceptionally good commutating characteristics under the severe conditions of varying speed and heavy overloads met with in railway service. It wears well and because of its smooth uniform quality it does not scratch the commutator and has practically eliminated chipping and pitting.

S-932 and S-933 Brushes

—for rotary converter slip rings. Low specific resistance, greater carrying capacity and longer life.

Try them out—a test will tell.

STACKPOLE CARBON CO.
St. Marys, Pennsylvania

**STACKPOLE
CARBON BRUSHES**



YOU need not suffer the usual epidemic of pull-ins and break-downs this winter. You can avoid them and most of the other troubles which keep your cars out of service, by proper winter lubrication.

The oils and greases which lubricate your rolling stock properly in warm weather do not do so in

cold weather. They thicken or congeal when subjected to cold, and do not flow easily. Consequently they do not reach all parts of the bearings and journals requiring lubrication, and hot boxes and burnt-out bearings are the result. To secure proper winter lubrication it is necessary to use lubricants which have been developed especially for cold weather use.

Standard Winter Motor Journal Oils and Standard Winter Gear Greases

equalize the handicap of cold weather. They flow easily at low temperatures and give you winter lubrication identical to that which you obtain during the summer months. These Standard Winter Lubricants will keep your cars on the road this winter. They will save you the cost of repairs and replacements, as well as the losses which

always accrue when your cars are out of service.

There is also another way in which Standard Service will save you money. Our warehouses carry your supplies of lubricants in stock and our trucks deliver them to your shops as needed, and pick up the empties. There are no hauling, insurance, storage or other charges for you to meet.

That you may be certain that you are getting proper lubrication for all equipment and rolling stock, we maintain a corps of lubricating engineers who are at your service when you need help in solving your lubricating problems.

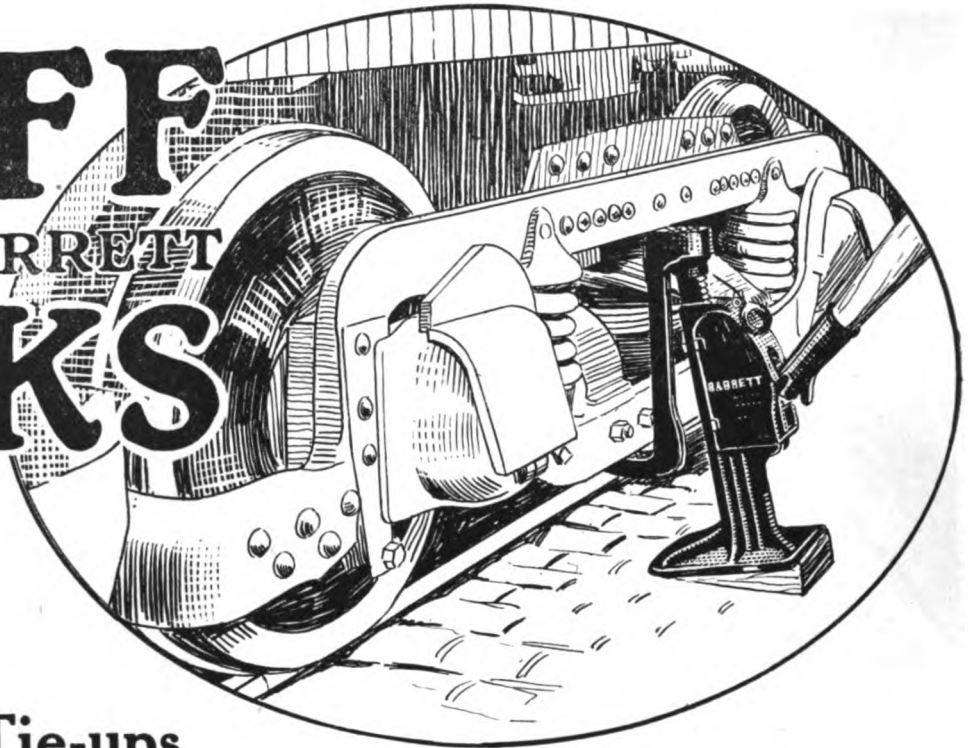
You will be under no obligation, of course, when you write us for additional details.

STANDARD OIL COMPANY
(INDIANA)
910 S. Michigan Avenue CHICAGO, ILLINOIS

DUFF

GENUINE BARRETT

JACKS



Relieving Derailments, Tie-ups and accidents quickly

On the thousands of cars where a Duff No. 239 Jack is carried as standard equipment, it has proven invaluable in emergencies. This sturdy and handy jack quickly puts a derailed car back on the track, and equally quickly gets a stalled truck out of the way, be it ever so heavy. By means of forged steel swivel claw, loads can be *lifted* as well as *pushed* aside. The claw may be lowered to within 3 in. of the ground, and be raised 10½ in. This gives it an unusually wide range of usefulness.

For Track Work—the Duff No. 1 Trip Jack continues to be the tool favored

by the greatest number of steam and electric railways. Its latest and most improved design embodies several new and convenient features. Write for special bulletin.

For Car Shops—the genuine Barrett Ratchet Jacks and Duff Ball Bearing Screw Jacks, in capacities from 10 to 50 tons, are the World's standard.

Duff Catalog No. 106—latest edition—describes a complete line of jacks, meeting every requirement of electric railway companies.



Barrett No. 2, a general utility jack of 10 tons capacity. Dependable, quick-raising, convenient; the World's leading 10-ton jack

THE DUFF MANUFACTURING CO., Pittsburgh, Pa.

Established 1883

New York

Chicago

Atlanta

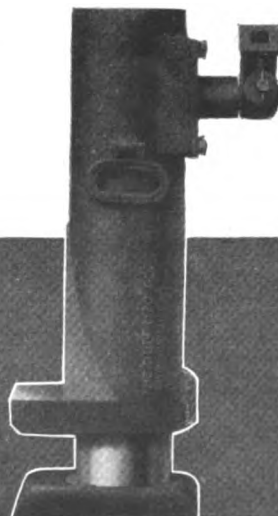
St Louis

Houston

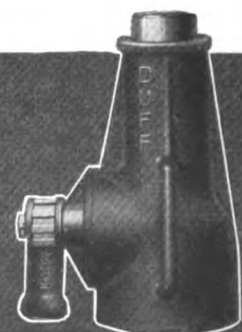
San Francisco



No. 1 Track or Trip Jack — Genuine Barrett



Duff Ball Bearing Screw Jacks in capacities from 10 tons up



Duff Ball Bearing Journal Jacks, in different sizes and capacities

Straus Building, Chicago.
Sherarduct Conduit was
used. Graham, Anderson,
Probst & White, Architects.
L. K. Comstock & Co., Elec-
trical Contractors.

It Bends



—yet the surface won't crack or peel

OF course, *Sherarduct* is a rigid conduit, but the *Sherardizing process anneals it to a degree that makes *Sherarduct* the conduit that may be "cold bent" right on the job—with little effort.

And the heavy, pure zinc coating which is made a part of the pipe will not crack or peel off at the bends, no matter how small the radius.

Over the Sherardized surface is a baked-on coat of acid proof enamel—added protection against corrosion.

Besides its easy bending qualities *Sherarduct* has a smooth, glass-like interior that makes fishing of wires easy.

A small Sherardized copper disc, ground down in center to show alloying of the zinc with the copper will be sent free to Architects and electrical engineers on request.

National Metal Molding Company



WORLD'S LARGEST PRODUCERS OF ELECTRICAL
CONDUITS AND FITTINGS



1147 Fulton Building, Pittsburgh, Pa.

Represented in all principal cities

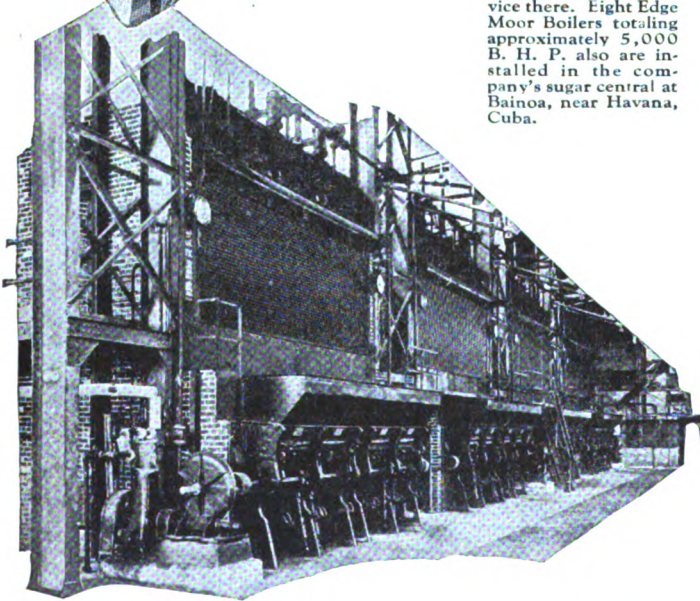
**Alloying of the pure zinc with the steel pipe under intense heat.*

Sherarduct

The Rigid Conduit That Bends



The model plant of the Hershey Chocolate Co. at Hershey, Pa., showing new power plant at right and (below) four 750 H. P. Edge Moor Boilers in service there. Eight Edge Moor Boilers totaling approximately 5,000 B. H. P. also are installed in the company's sugar central at Bainoa, near Havana, Cuba.



DURING the past ten years the Hershey Chocolate Company has installed twenty Edge Moor Boilers, totaling more than 12,000 B.H.P., in its model plant at Hershey, Pa., and its sugar central at Bainoa, Cuba.

These boilers represent five separate orders—the first placed in 1913, the latest in 1923. The performance of the first Edge Moor Boilers at Hershey resulted in their selection for the new power plant built in 1920, and for the Cuban mill.

In the confectionery industry, as in a score of others, Edge Moor users are among the representative leaders.

The Edge Moor catalogue details the advantages of this boiler that have won it preference among discerning purchasers. We shall be glad to send you a copy.

EDGE MOOR IRON COMPANY
Established 1868
EDGE MOOR, DELAWARE

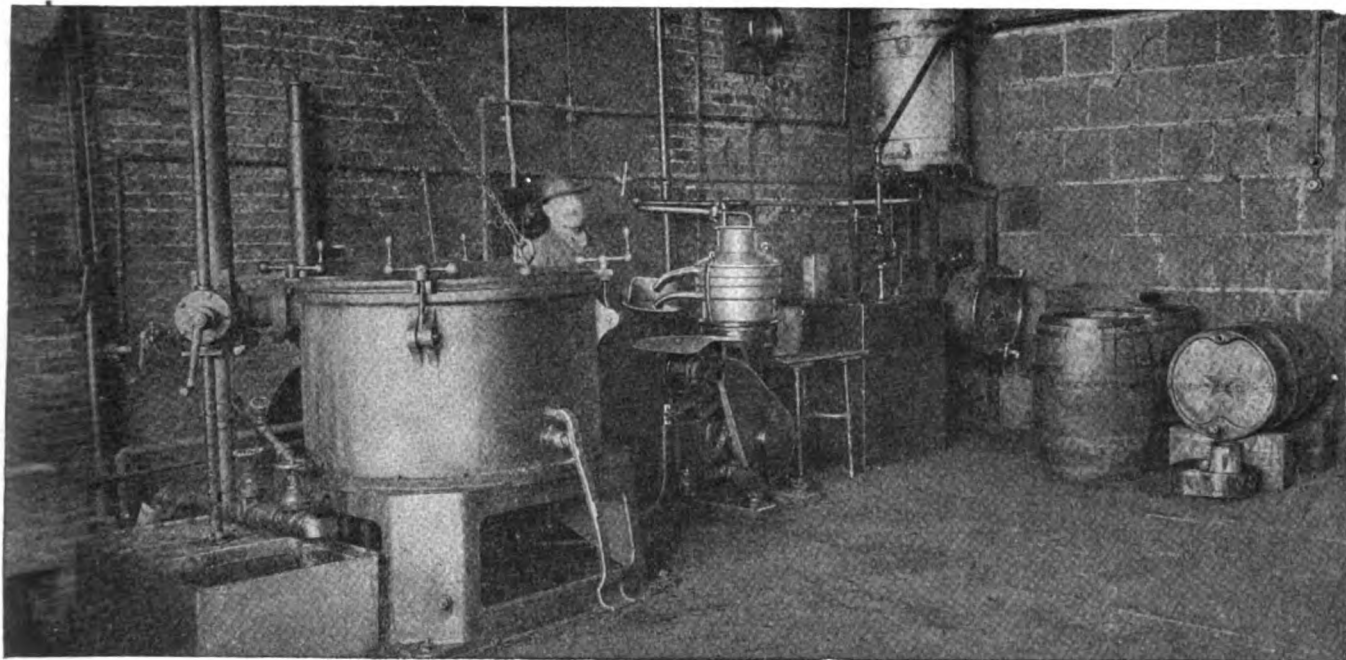
New York
Chicago
St. Paul

Boston
Pittsburgh
Charlotte



EDGE MOOR Water Tube BOILERS

FOR INCREASED FUEL ECONOMY



Showing the general arrangement of the car axle oil reclaiming department in the Cold Spring shops of the Milwaukee Electric Railway & Light Company. The De Laval Purifier is in the center of the photograph at the right of the centrifugal extractor.

Save 15,000 gallons of car axle oil a year with De Laval Purifier

Each year the Milwaukee Electric Railway & Light Company saves 15,000 gallons of oil which was formerly lost in the waste removed from car journals. The simple equipment shown above enables the reclamation of this oil at a cost of about four cents a gallon, and the De Laval Oil Purifier restores it to practically its original state of purity.

In the same plant the coal dust in the lubricating oil of motors used to drive pulverized coal-handling equipment was cutting bearings. Another De Laval Purifier was installed so that the motor oil is continuously passed through it and purified. As a result, bearing trouble has been eliminated and the consumption of oil greatly reduced.

This company also uses a De Laval Oil Purifier to keep in proper condition the oil used to lubricate its prime movers and generators. A fourth De Laval Centrifugal has lowered the cost of maintaining the dielectric strength of transformer oil and switch oil. This machine—the De Laval Transformer Oil Purifier—is a portable unit which can be easily moved from one sub-station to another.

Here are four savings which De Laval Centrifugals will make for any street railway—and there are others. In the case of small systems it is often possible for two De Lavals to do the work of the four used by the company mentioned above.

The De Laval Separator Company

165 Broadway, New York

29 East Madison St., Chicago

DE LAVAL PACIFIC COMPANY

San Francisco

Sooner or later you will use a
De Laval

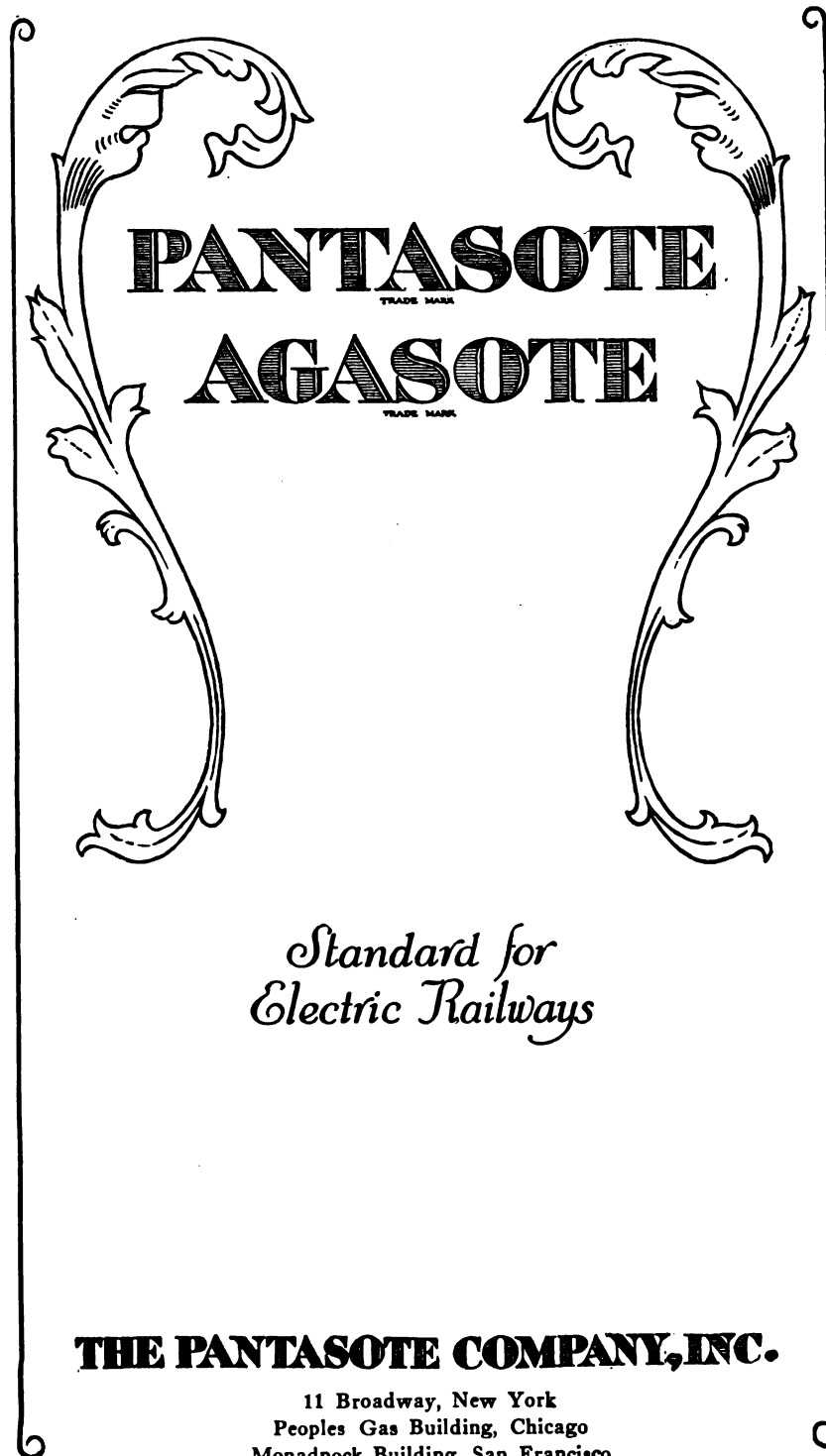
Please send Bulletin containing further information regarding

- ☐ Reclamation and purification of car axle oil.
- ☐ Purification of turbine lubricating oil.
- ☐ Purification of Diesel lubricating and fuel oil.
- ☐ Purification of motor oil.
- ☐ Dehydration of transformer oil.

Name.....

Company.....

Address..... E. R.-J



PANTASOTE
TRADE MARK

AGASOTE
TRADE MARK

*Standard for
Electric Railways*

THE PANTASOTE COMPANY, INC.

11 Broadway, New York
Peoples Gas Building, Chicago
Monadnock Building, San Francisco



STOP

In
1924

Stop transfer abuses with the Moran Patent Transfer

The latest improvement in transfer design, this Moran Patent Transfer *fixes* the time limit beyond dispute. Its validity is instantly apparent to the conductor—time-expired transfers are instantly detected. A.M. and P.M. indicated by contrasting colors, time limit controlled by tearing off the perforated coupons—conductors can issue this transfer with greatest rapidity.

Let us put you in touch with roads which have adopted the Moran Patent Transfer.

GLOBE

Tickets—Transfers—Passes

As specialists in this class of work, we can offer expert assistance and service in the designing of suitable tickets to meet the requirements of any special case.

Our extensive facilities and large production enable us to produce at lowest cost.

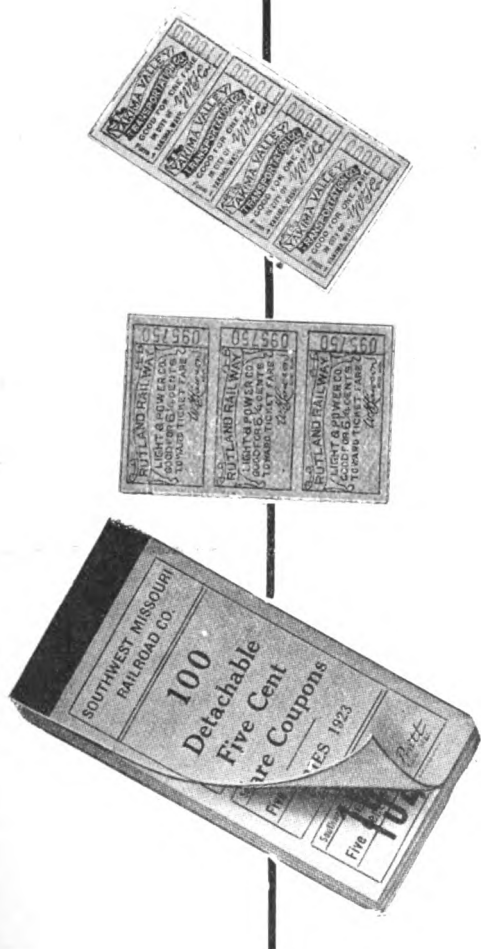
GLOBE TICKET COMPANY

116 N. 12th Street, Philadelphia, Pa.

Los Angeles

New York

San Francisco



CONSOL

Lining up for 1924

Statistics show the year just past a banner one for new car construction. Statistics alone tell but part of the story. More than ever before, new cars include equipment devised for greater passenger comfort, for safety and for expediting schedules.

These are the primary functions of Consolidated devices! Witness the big orders of the past year, Philadelphia, Brooklyn and others where Consolidated Equipment was included.

*Plan your 1924 cars accordingly.
Our Experts are at your service
for consultation at any time.*

Consolidated Car Heating Co.

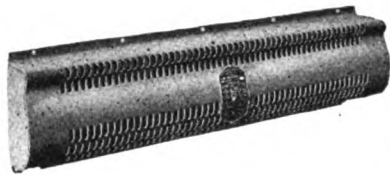
New York

Albany

Chicago



UPDATED



Heaters

Our Catalog illustrates styles and types to meet any requirements. Consolidated Thermostat control is an essential part of any modern car.



Bells and Buzzers

Complete car signaling systems, single stroke bells, buzzers, passenger push buttons and motormen's signal lights.



Door Engines

Pneumatic door operating equipment of the latest improved types, remote control, and specialties developed to be adapted to any particular conditions.

AUTOMATIC VENTILATORS





*No. 108
De Luxe
Motor Bus
Seat*

HALE-KILBURN SEATS

Suitable Styles for:
City Cars
Safety Cars
Interurbans
Motor Buses

HALE-KILBURN COMPANY

Sales Hale-Kilburn Company,
30 Church Street, New York.
Offices: Hale-Kilburn Company,
1530-33 McCormick Building, Chicago, Ill.

E. A. Thornwell,
1513 Candler Building, Atlanta, Ga.
National Safety Car & Equipment Co.,
Theresa and Clark Ave., St. Louis, Mo.



*Standard
Rattan
Walkover
Steel Seat*



*Lightest Weight
Stationary
Steel Seat*

Riding Habits of 1924

Necessity *vs.* Convenience

Whether you operate motor buses, or railway cars, or both, you'll find the big traffic goes where comfort and convenience are afforded.

Don't be satisfied with the "necessity" riders alone. Increase your business by going after the others.

Hale-Kilburn Seats, scientifically correct in shape and springwork, making riding more than comfortable—they make it a matter of pleasure.

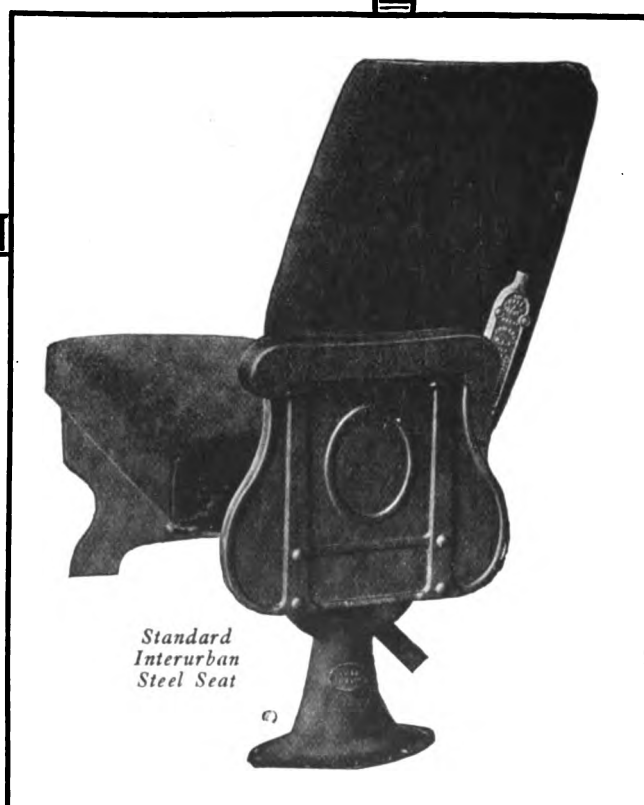
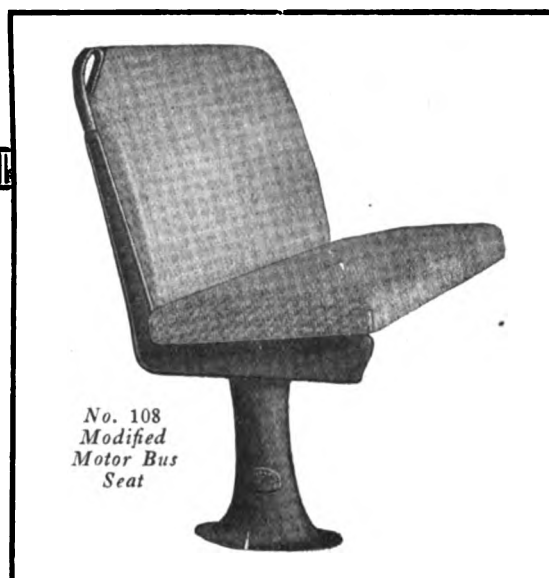
The patented Space-Saving Feature permits of maximum capacity without "crowding."

Hale-Kilburn Seats are
Lightest, Strongest, Simplest, Neatest

NY, PHILADELPHIA, PA.

Frank F. Bodler,
903 Monadnock Building, San Francisco, Cal.
Chris Eccles,
320 South San Pedro Street, Los Angeles, Cal.

Harry M. Euler Company,
46 Front Street, Portland, Ore.
T. C. Coleman & Son,
Starks Building, Louisville, Ky.



Quotations



from Users

Excerpts from official letters and statements prove the Miller Trolley Shoe case

Instead of telling our own story, we let these testimonials speak for Miller Trolley Shoes. It's not a question of what we claim, but rather what our satisfied customers claim for us. Read below what they say about Miller Trolley Shoes.

<u>Fewer dewirements</u>	<u>Less wire wear</u>	<u>Better than wheels</u>
Interstate Public Service Co. "—We have fewer dewirements with shoes as they stay with the wire much better than wheels."	Ephrata, Lebanon Traction Co. "—our experience has been that trolley shoes do not wear the wire as fast as wheels."	Portland-Lewiston Interurban. "—have relieved us of many of the difficulties experienced with wheels and, unquestionably, for our service are the most satisfactory form of current collectors."
Knoxville Ry. & Lt. Co. "—they give much better contact and stick to the wire better than wheels."	Chicago, No. Shore & Milwaukee R.R. "—condition found on inspection shows conclusively that there is less wear on the trolley wire."	Pacific-Northwest Traction Co. "—give much better and more constant contact." "—more economical than wheels."
Havana Central R.R. Co. "—find that they hold the wire better than wheels on our lines."	Portland-Lewiston Interurban. "—measurements speak for themselves; trolley wire wear is materially reduced."	Knoxville Ry. & Light Co. "—we consider them more economical than wheels."
Hudson Valley Ry. Co. "—no dewirements."	Interstate Public Service. "—they do not wear the trolley wire faster."	Waterloo, Cedar Falls & Northern, Ry. "—have been using Miller Trolley Shoes on our interurban lines for past three years and find them entirely satisfactory."
Orleans-Kenner Traction Co. "—trolley pole does not leave the wire when shoes are used."	Knoxville Ry. & Lt. Co. "—we have fewer emergency calls for line breaks."	Havana Central R.R. Co. "—get longer life out of a Miller Trolley Shoe than a wheel."
		Hudson Valley Ry. Co. "—more mileage, better contact."

Miller Trolley Shoes have many other advantages

1. They are cheaper to maintain. The sliding contact shows about 60% more mileage and when finally worn out is cheaper to replace than a trolley wheel.
2. No lubrication is required. The nightly oiling of trolley wheels is eliminated.
3. They run quietly, avoiding entirely that annoying rumble made

by the trolley wheel running at high speed.

4. Their constant contact—over a 3-inch surface—means better current supply to motors, less resistance, and steady lights at night, instead of flickering ones.

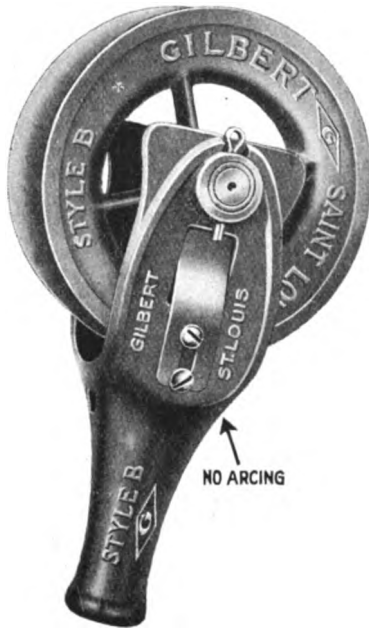
5. They require less tension in the trolley springs—only about two-thirds that required by wheels.

MILLER TROLLEY SHOE CO., Boston-21, Mass.

Western Representative:

Economy Electric Devices Co., 1509 Old Colony Bldg., Chicago, Ill.

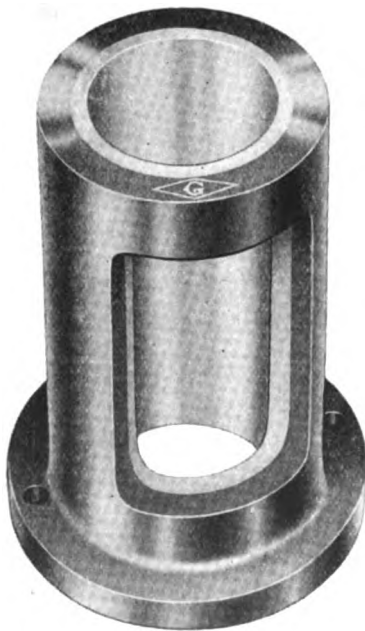
MAINTENANCE COSTS



Are cut to a minimum
with Gilbert's Style "B"
Harp and Wheel.

The best alloy—perfect
balance, non-arcng.

A Trial Will Convince You



Armature Bearings

Finished to your prints.

Lined with our "C" grade
Nickel Babbitt—*the best
ever.*

"NUF SED"

A. GILBERT & SONS BRASS FOUNDRY CO.

ST. LOUIS, U. S. A.



THE greatest asset of Carnegie Steel Company is the reputation of Carnegie products.

It is only natural then that everything be done to protect that reputation.

This is accomplished through absolute control of manufacture from ore mine to finished material. Conscientious supervision at each separate stage of production can be therefore, and is, maintained.

Thus we can faithfully assure that every Carnegie product measures up to its good name.

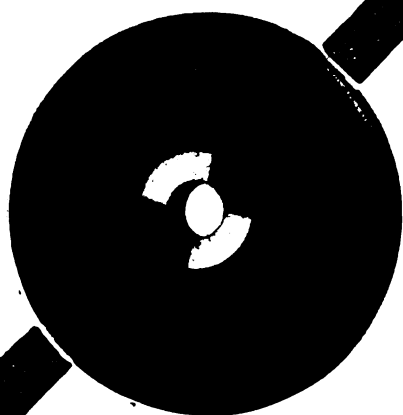
For Electric Railway Service—Wrought Steel Wheels, Axles, Rails, Cross Ties, Track Accessories, Car Building Sections.

Carnegie Steel Company

General Offices:

CARNEGIE BUILDING
434 FIFTH AVENUE

Pittsburgh, Pa.



GRIFFIN

F. C. S. Wheels

From the standpoint of both
Economy and *Safety* the
CHILLED IRON WHEEL is
the ideal wheel for *all classes*
of service.

**LOW COST
MAXIMUM
MILEAGE**

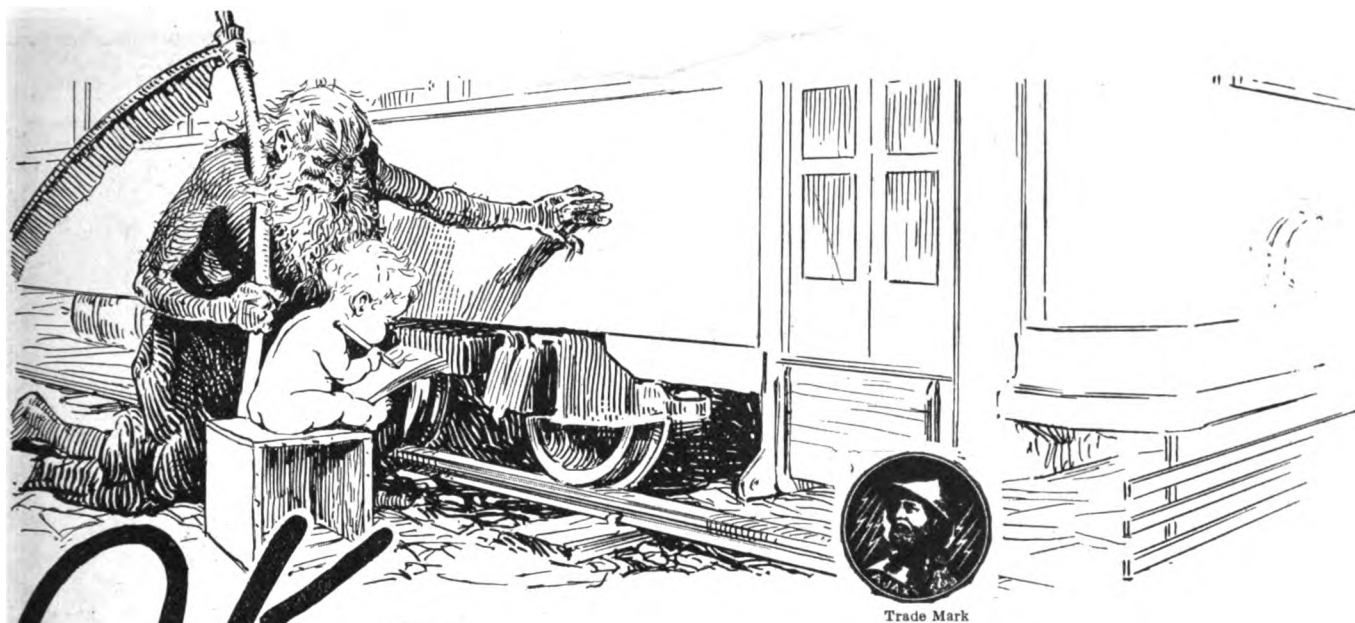
Facilities at each foundry for
mounting wheels on axles

Griffin Wheel Company
McCormick Building, Chicago, Ill.

FOUNDRIES:

Chicago	Detroit	Boston	Los Angeles	Denver
	St. Paul	Tacoma	Kansas City	
		Council Bluffs		





O.K. - if they have— AJAX METAL BEARINGS



Ajax Car Brasses



Ajax Check Plates



Ajax Bull Bearing Alloy

MAKE a New Year inspection of the possibilities of better bearing metals. Here's a place for bettering service! Here's an opening for standardization! Here's a starting point for instituting economies! Over 40 years' experience with a consistent policy of "quality first" is the background of Ajax Bearings.

Here are a few of Ajax Specialties—

AJAX CAR BRASSES—leaders in their field for more than forty years. They are cast of finest quality metals, and turned with the accuracy and precision of a car wheel.

AJAX CHECK PLATES—made of our Perfecto Bronze, which will bend before it will break.

AJAX ARMATURE BABBITT is unsurpassed for adaptability and service.

AJAX BULL BEARING ALLOY—a thoroughly dependable and economical lining for brasses and axle bearings. It lasts longer, runs cooler and costs less.

Specify Ajax products for new equipment and repairs.

The Ajax Metal Company

Established 1880

Philadelphia, Pa.

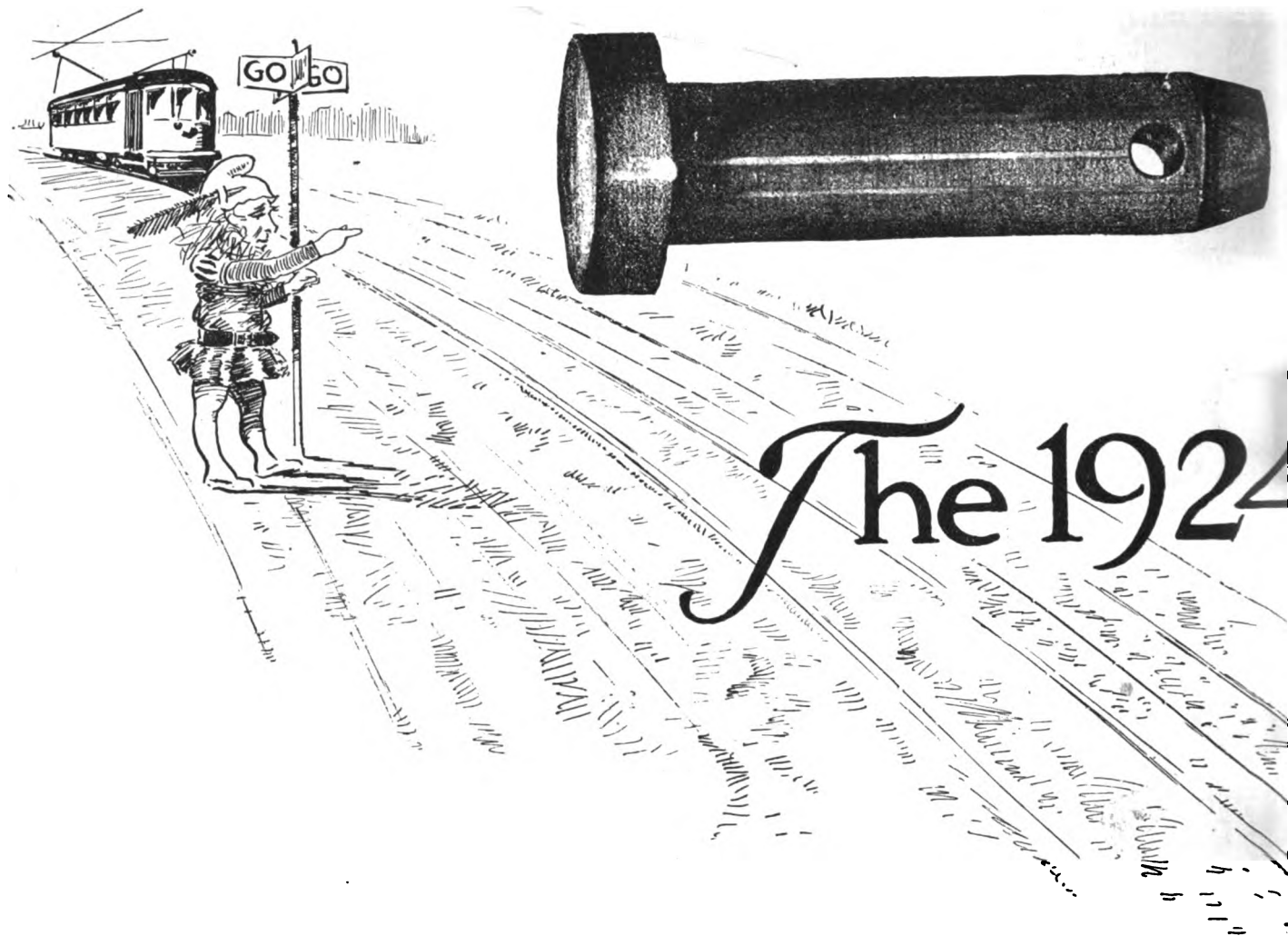
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Chicago

Boston

Cleveland

AJAX BEARING METALS and CASTINGS



Bemis Car Truck Company

Electric Railway Supplies

Springfield, Mass.

Representatives:

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W. F. McKenney, 54 First Street, Portland, Ore.

J. H. Denton, 1328 Broadway, New York City, N. Y.

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Road to Economy

Use the strongest stuff!

THE kind that still has a kick in it long after the ordinary material has gone to the scrap heap.

That's what the Boyerizing Process imparts to iron and steel equipment for brake rigging and car trucks. They wear from three to four times as long as parts of ordinary untreated steel.

Start in this year making all replacements with Boyerized Parts—you'll profit from a much longer interval before the next replacements become necessary.

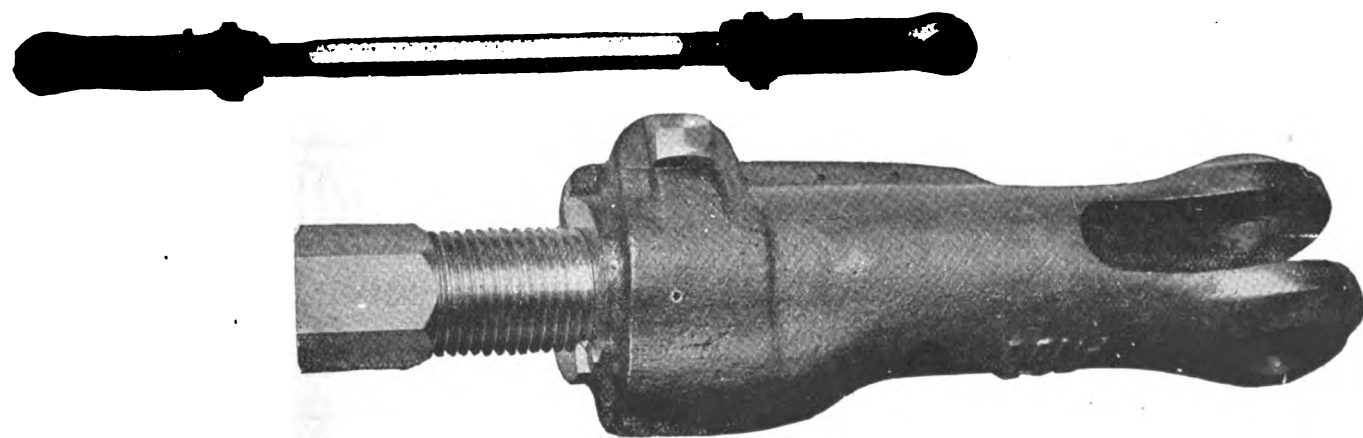
Brake Pins	Center Bearings	Pedestal Gibs
Brake Hangers	Bronze Bearings	Spring Posts
Brake Levers	Side Bearings	Spring Post Bushings
Brake Fulcrums	Bushings	
	Manganese Brake Heads	
	Manganese Truck Parts	
	Bolster and Transom Chafing Plates	

Let us quote on your requirements

The McARTHUR TURNBUCKLE

When you once set it up it stays set up! The powerful spring-equipped split-clamp device which takes the place of the old-fashioned lock-nut idea, holds with an unshakable grip. Yet it takes only a small monkey wrench and a moment's time to tighten it up. Like all other Boyerized equipment, McArthur Turnbuckles have an unusually long wearing life.

Try them!



Kalamazoo

trolley wheels and harps

THE VERY FACT that Kalamazoo Trolley Harps and Wheels are made by the largest concern of its kind in the World is in itself an indication of their standard.

Our products are made in a shop devoted exclusively to these specialties. Today we are supplying the major part of the entire demand of the United States. There must be a reason for this, and there *is*. And that is, a high reputation due to high quality.

Kalamazoo Trolley Harps and Wheels have been endorsed by the leading electric roads since their inception on the market over 25 years ago.

Kalamazoo wheels are made of virgin metal—pure lake copper—they are of proper design for the intended service, and are honestly manufactured.



Kalamazoo Harps give perfect and continuous contact, and are designed to permit easy replacement of wheels. There is only one cotter pin to be taken out to remove the wheel. They are balanced for easy running and freedom from slippage. They do not wear down and damage the wire, for wire life is more important than wheel life.



STAR BRASS WORKS

Kalamazoo, Michigan

The largest exclusive manufacturers of trolley wheels in the world

*Safety cars are little things
But they last for years.
Why not buy them on the start
Equipped with "Tool Steel" gears.*

**The Tool Steel
Gear and Pinion Co.
Cincinnati, O.**



Durability!

The colored spots on
**Samson Spot
Trolley Cord**
(Waterproofed)

are the distinguishing marks which identify this superior cord from all others. The spots themselves have nothing to do with the quality—they merely indicate that this is the Samson Trolley Cord which has the well-known qualities of unusual endurance, freedom from imperfections, non-shrinking, non-swelling and non-stretching. In short the most satisfactory and cheapest trolley cord in the long run.

**Samson Bell and
Register Cord**

A hard smooth-finish cord which affords the greatest possible resistance to the wear and tear of strenuous service. Made in white, drab or mahogany colors. Wire center if desired.

SAMSON CORDAGE WORKS
88 Broad St., Boston, Mass.

*If you have never used
Samson Spot Trolley
Cord, let us send you a
sample to examine.
Write for it.*

CHILLED IRON WHEELS

from

50

foundries..

for railway
and
street car
service

Capacity
20,000 a day

25,000,000
in service

THE map above shows the location of the 50 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago, 4
St. Louis, 2
Buffalo, 4
Pittsburgh, 2
Cleveland, 2
Amherst, N. S.
Montreal
Mich. City, Ind.
Louisville
Mt. Vernon, Ill.
Ft. Wayne, Ind.
Birmingham
Atlanta
Savannah
Boston
Detroit
St. Paul
Kansas City, Kan.
Denver
Tacoma
Rochester, N. Y.

Sayre, Pa.
Berwick, Pa.
Albany
Toronto
New Glasgow, N. S.
Madison, Ill.
Huntington, W. Va.
Wilmington, Del.
Houston, Tex.
Hannibal, Mo.
Reading, Pa.
Baltimore
Richmond, Va.
Ft. Williams, Ont.
St. Thomas
Hamilton
Ramapo, N. Y.
Marshall, Tex.
Los Angeles
Council Bluffs

American Railroad Association Standards

650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
750 lb. wheel for 100,000 Capacity Cars
850 lb. wheel for 140,000 Capacity Cars

*The Standard Wheel
for Seventy-Three Years*

ASSOCIATION OF MANUFACTURERS
OF CHILLED CAR WHEELS

1847 McCormick Bldg., Chicago

Experience suggests

Costs Higher on Supplies Manufactured in Railway Shops

One of the larger railways, which had undertaken to manufacture a number of things in its own shops, such as axle and armature bearings, cast-iron brake shoe hangers, door and step mechanisms and other regularly used maintenance supplies, recently checked its costs against the prices of manufacturers for these same articles. This company had found that it had to add 97 per cent to the prime cost of labor and material to cover its overhead expense. Upon submitting specifications on twelve articles, as manufactured in the company's shops, to several manufacturers, the bids received were lower in every case than the company's costs, a fairly sizable quantity having been specified. Needless to say, the company ceased manufacture in its own shops.

The superintendent of equipment said his shop was supplied with machine tools and handling equipment rather better than the average railway shop. The difficulty is that the average shop is equipped with utility tools, which are maintenance tools and not manufacturing tools. A manufacturing plant is supplied with high-speed tools, and the work is organized and the employees are particularly trained in production work. As soon as a manufacturing program is put into the maintenance plant, it takes the mind of the master mechanic off maintenance and onto manufacturing. This equipment man remarks that the two kinds of shop work simply will not mix, and the railway nearly always makes a mistake in trying to manufacture its own supply parts.

*Recent news item
in the Electric
Railway Journal.*



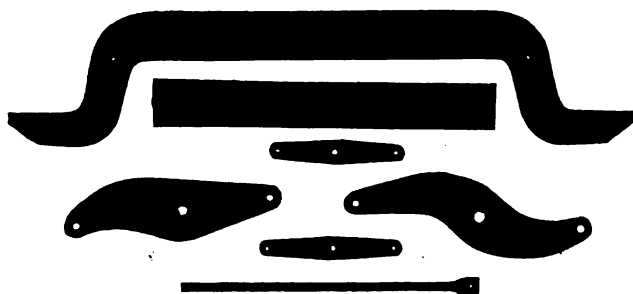
COLUMBIA MACHINE WORKS

3313 Atlantic Avenue,

'Let Columbia Do It'



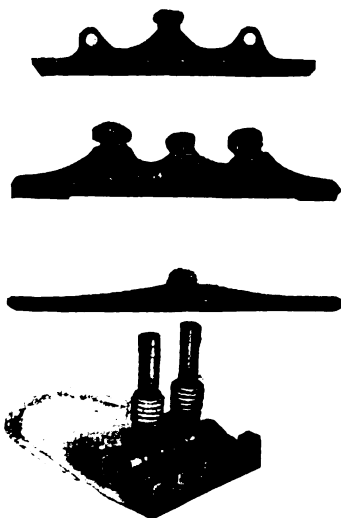
**Equipped
to manufacture railway supplies!**



Manufacturing on a production and quantity basis means lower costs. Columbia has the high-speed machines, the proper tools, the necessary patterns, molds, jigs and dies.

You take care of maintenance—let Columbia do the manufacturing.

COLUMBIA PRODUCTS



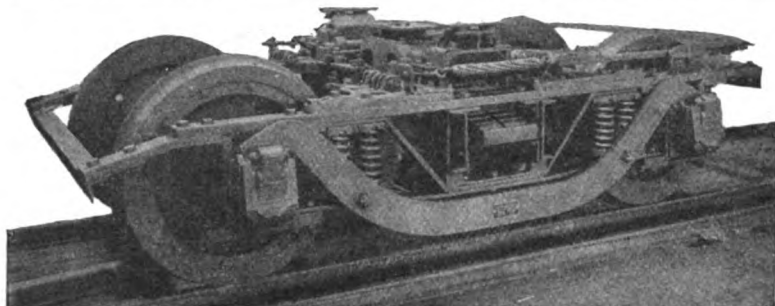
Axle and Armature Bearings
Brake and Truck Parts
Door and Step Mechanisms
Line Materials Brush Holders
Controller Parts
Gear Cases Resistance Grids
Commutator Parts
Trolley Wheels

**Get Columbia quotations
on every job!**



AND MALLEABLE IRON COMPANY
Brooklyn, N. Y.

BALDWIN



Baldwin Class "AA" Motor Truck, Built for Osaka Railway, Japan

For Many Foreign as well as American Electric Railways Baldwin Improved Motor Trucks are Specified

BALDWIN Locomotive-Built Motor Trucks are backed by more than 90-years experience in the building of railroad motive-power and they are giving unexcelled service on many electric railways throughout the World.

On a number of the railways in Japan, several types of Baldwin trucks are in

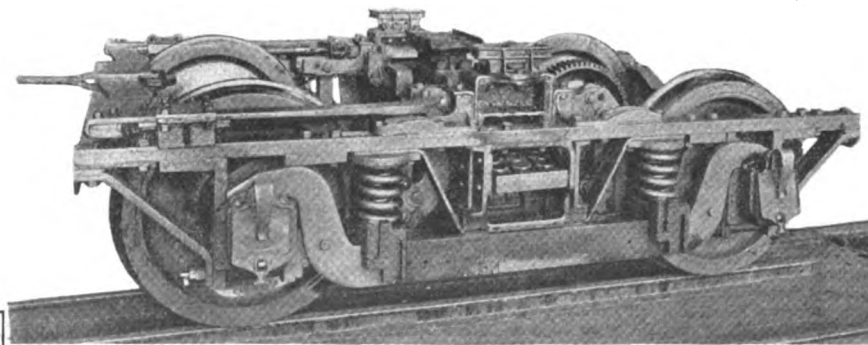
use, varying with the conditions of the service.

Baldwin designs practically cover all the requirements of electric railway service, from the short street car line operating at moderate speeds to the interurban line where heavy cars are run at maximum speeds of 70 or 80 miles per hour.

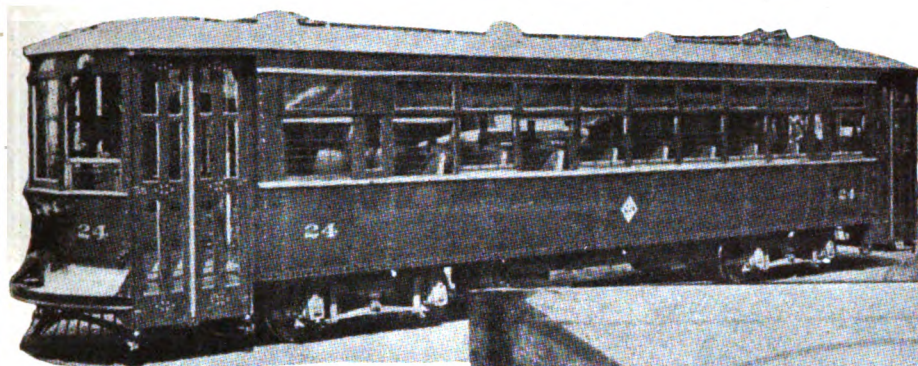
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THE BALDWIN LOCOMOTIVE WORKS PHILADELPHIA, U. S. A.

Baldwin Motor Truck for Northwestern Elevated Railway Co., Chicago, U. S. A.

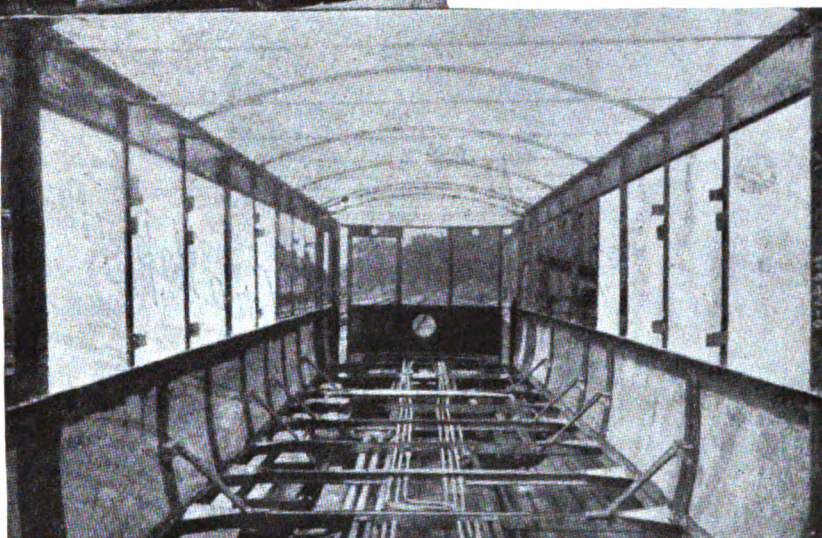


MOTOR TRUCKS



Light weight interurban cars of the Youngstown and Suburban Ry. Has-kelite roofs and Plymetl sides, because good heat insulators eliminate the need of linings.

To the right, a Youngstown Car with Plymetl heat-insulating side panels. The Has-kelite independent self-supporting roof structure is carried on four-corner piers—the window posts act simply as guides for the window sash.



Without sacrifice of durability, the Youngstown Cars are made lighter and their construction details simplified thru the use of HASKELITE roofs and PLYMETL sides.

Steel sides on these cars would weigh appreciably more than the PLYMETL, and steel would not give the excellent heat insulation afforded by PLYMETL. PLYMETL is easily formed to curved shapes. It is more readily drilled and cut than steel.

Weight was saved in the roof because HASKELITE is 30 to 40% lighter than T and G construction. Moreover the HASKELITE roof is an integral self supporting structure—making it possible to use light weight side posts.

Car designers and builders whose objective is weight reduction with a conservative factor of safety should have a copy of our booklet "HASKELITE and PLYMETL in Street Cars."



Haskelite Manufacturing Corporation

133 W. Washington St., CHICAGO, ILL.



ON THE ADVENT of our thirty-fifth year of service to the electric railway industry, we extend to all a cordial invitation to call upon us at any time during the year for assistance, suggestions, estimates or quotations. We are always glad to give to railway operators, the benefits of our long experience, our engineering data and our manufacturing resources.

"Quality" is our motto in car construction and car equipment.

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 St. Louis, Mo.
The Birthplace of the Safety Car

New McGraw-Hill Books

of Interest to Electric Railway Executives

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First Principles

Second Edition

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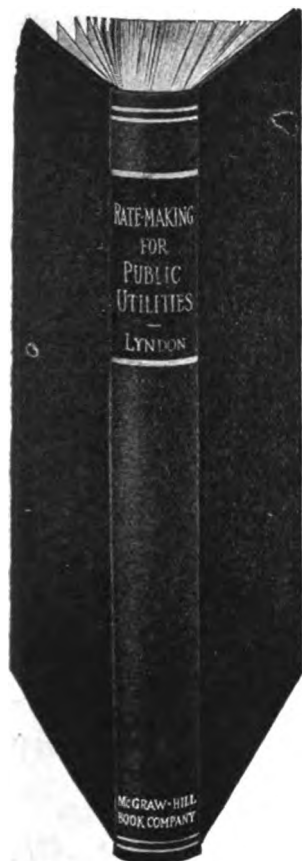
The book presents an analysis of the general problem of investment. The principles of compound interest, sinking funds, depreciation cost, operation cost, and first cost are thoroughly discussed.

The procedure in estimating receives special attention.

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In justice to yourself and your patrons, who do not always understand your winter troubles, be prepared for the day that the wire will be thick with ice and sleet.

Insurance against a sleet storm is a very small item when figured in terms of Anderson Sleet Wheels and Cutters.

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**Albert & J. M. Anderson
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Established 1877



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in general, study the question of *wood durability* for other purposes, as carefully as *Railway Signal* men have studied it for *Trunking* and *Capping*, there will be a lot more

“ALL-HEART”
“TIDEWATER”
CYPRESS
“THE WOOD ETERNAL”

used for *Fencing, Ties, Car Material, Station Construction* and similar railroad requirements, to the very great economy of the companies using it.

The long service which “All-Heart” Tidewater Cypress gives, **SAVES LABOR COSTS FOR RENEWALS AND REPLACEMENTS**

—big items in themselves.

“All-Heart” Tidewater Cypress comes nearer being decay proof than any other wood.

This mark  on every timber, board and bundle of Tidewater Cypress is your insurance of true replacement economy.

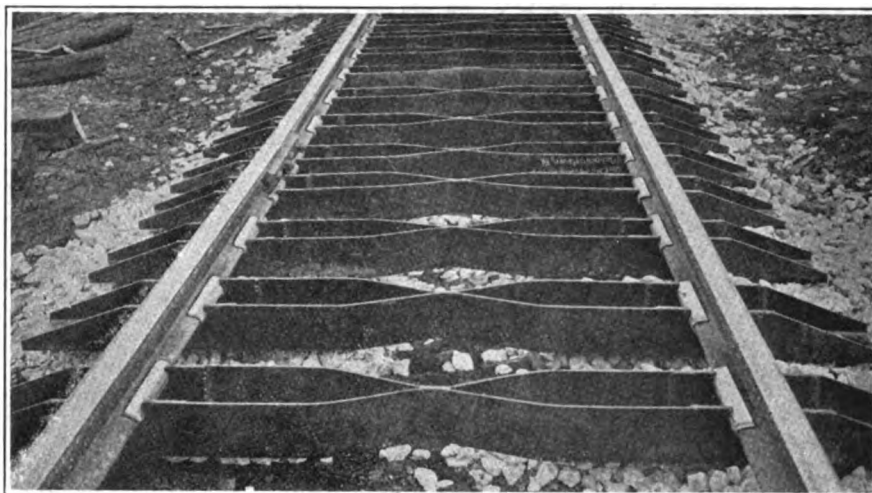
The data in support of these facts will be promptly furnished upon request.

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Answer the demand for a satisfactory "substitute" tie

"Give us something practical"—has been the cry of the railway engineer on this subject.

Here it is! Proved by actual service on several steam and electric railways.

No spikes, bolts, lugs, tie plates, anchors or braces required. Ample bearing surface provided. (See illustration) lighter, stronger, more durable.

Flexibility provided by the "pinched" center, the shoulders of which are supported by tamped-in ballast thereby holding firmly in alignment against all strains.

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METAL SAFETY RAILWAY TIE CO., 522 No. American Bldg., Philadelphia, Pa.

RAMAPO AJAX CORPORATION

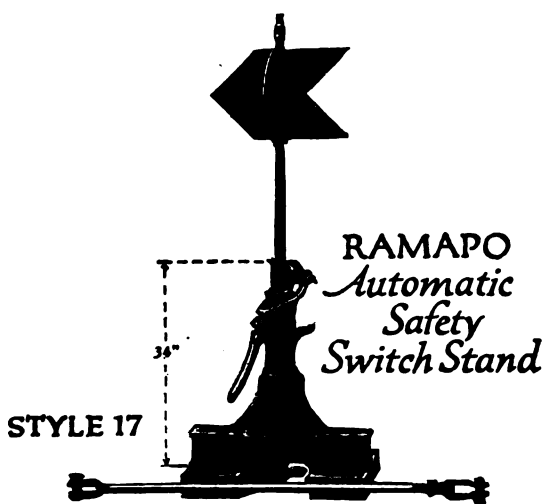
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(All types and Sizes)

Tee Rail Special Work Manganese Construction

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Our five completely-equipped plants, listed below, afford prompt service and careful attention to orders from any part of the United States or Canada.

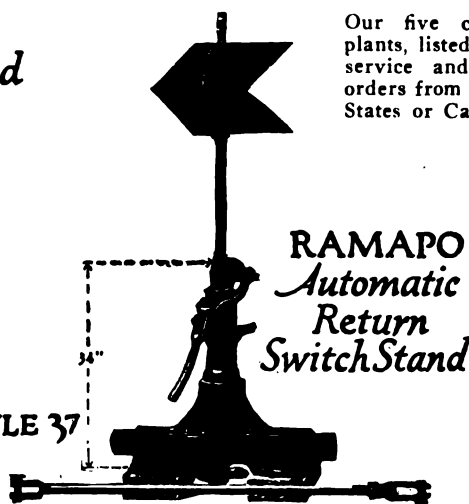


Ramapo Automatic Return Switch Stands have been designed especially for passing sidings on private right-of-ways where it is desired that switch points always remain in the same position after having been run through. The target always indicates the position of switch points, always showing whether the switch points are open or closed or if partially held open by an obstruction.

Ramapo Safety Switch Stands automatically lock in position when a switch is set wrong is run through. The first pair of wheels throws the switch points over and they remain in this position until reset by hand or the switch is trailed from the other side.

For hand operation both these types of stands operate in normal fashion.

STYLE 37



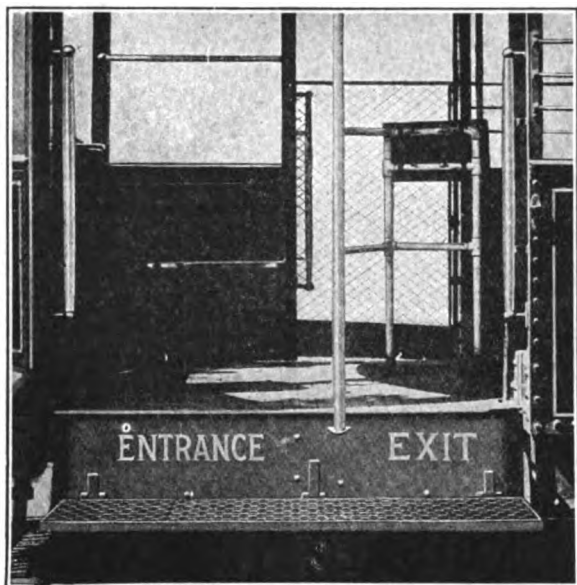
RAMAPO AJAX CORPORATION

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Chicago New York Superior, Wis.
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Canadian Ramapo Iron Works, Ltd.,
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TRADE MARK
(PATENTED) REG. U.S. PAT. OFF.
ABSOLUTELY NON-SLIPPING ALWAYS

There's permanent, in-built safety in every unit of these all-steel car steps. This non-slipping surface is an inherent part of them—not a temporary feature secured by mats or abrasive insets that will wear out or work loose. This foot-gripping, safety surface lasts as long as the step itself—which will probably outlast any car of which it is a part. Twenty-four standard sizes—special sizes to order. Write for Catalog 4A28.

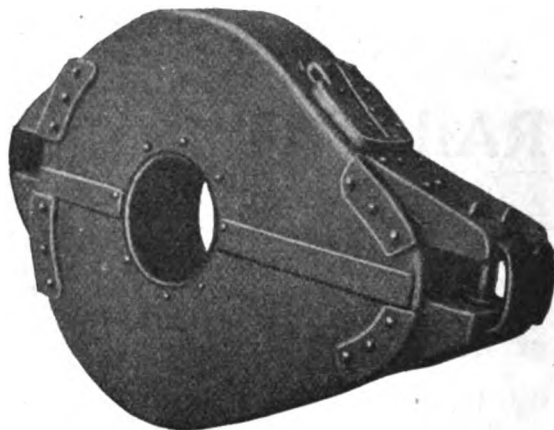
IRVING IRON WORKS CO.
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MANUFACTURERS OF

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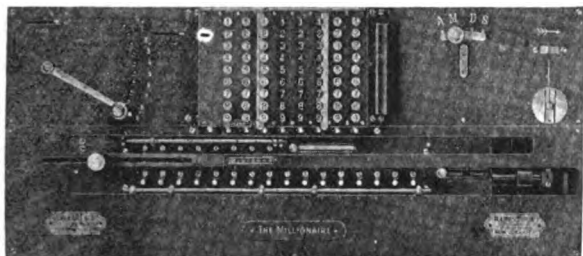
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"MILLIONAIRE"

(The durable machine)



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 $36452 \times 28573 = 1041542996$

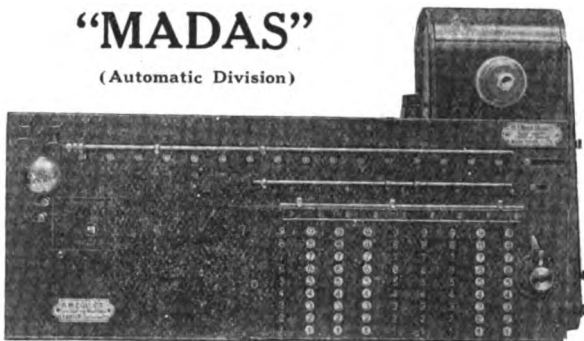
with only 5 revolutions of the crank. Greater speed and only about 1/5 wear and tear on mechanism.

Carriage moves automatically.

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(Automatic Division)



For Multiplication, Automatic Division, Addition and Subtraction.

This machine is very rapid in "Division," in which it operates automatically. The "Divisor" and "Dividend" are set up on the machine, and then the crank is turned until the desired number of digits have been obtained in the "quotient."

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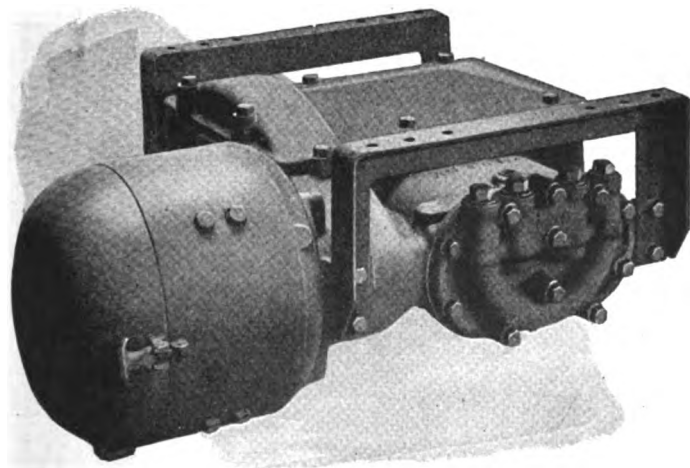
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AA-7B

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Compressor for Street Car Mounting

A single acting duplex compressor with crank case and cylinders integral. One-piece cylinder-head for both cylinders contains suction and discharge valves. Trunk pistons operated by connecting rods with bushings provided for taking up wear.

Heavily designed crankshaft of high-grade steel turns in journal bearings of ample proportions to insure minimum wear.

Herringbone Gears transmit power from motor shaft to crankshaft with practically silent operation.

Lubrication is positive and efficient. Connecting rods dip into the oil and splash reaches all working parts. Gears run in oil.

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OHMER

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Selling electric railway transportation according to correct business methods requires the indication and registration of the exact amount of each sale.

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Dayton, Ohio

The No. 62 Detail Fare Printer, for one man operation. This register indicates and records fares from one cent in value up to \$9.99 and prints a detailed record of each sale.

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Locates the power leaks

Defective bonds, unsuspected, hidden, like a thief in the night, are stealing directly from your coal pile. You cannot see them, neither can you measure the loss at the power plant. It's only when neighboring water and gas pipes break down under the electrolytic effect that you realize how bad conditions really are.

Roller-Smith Bond Testers, used to check up rail bond conditions, promptly discover the bad ones. Fix those and you stop your power losses and avoid damages from electrolysis.

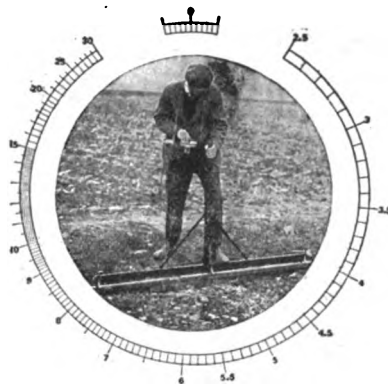
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Electrical Instruments, Meters and Circuit Breakers

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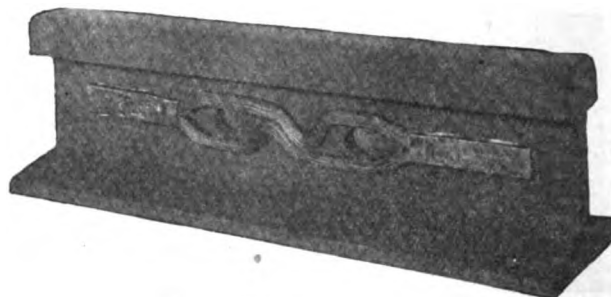
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160 pages of helpful information, of value alike to the student, the buyer and the man in the shop.

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Plan Now for your Spring Rail Bonding

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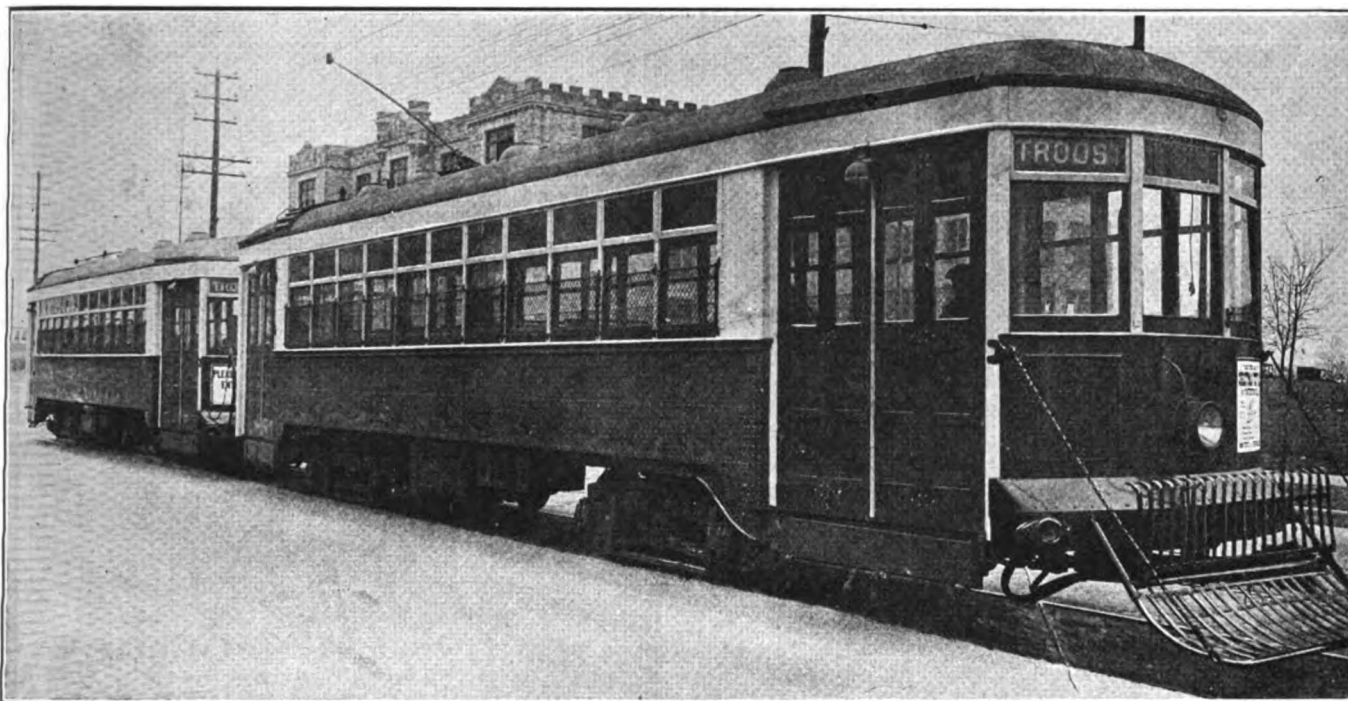


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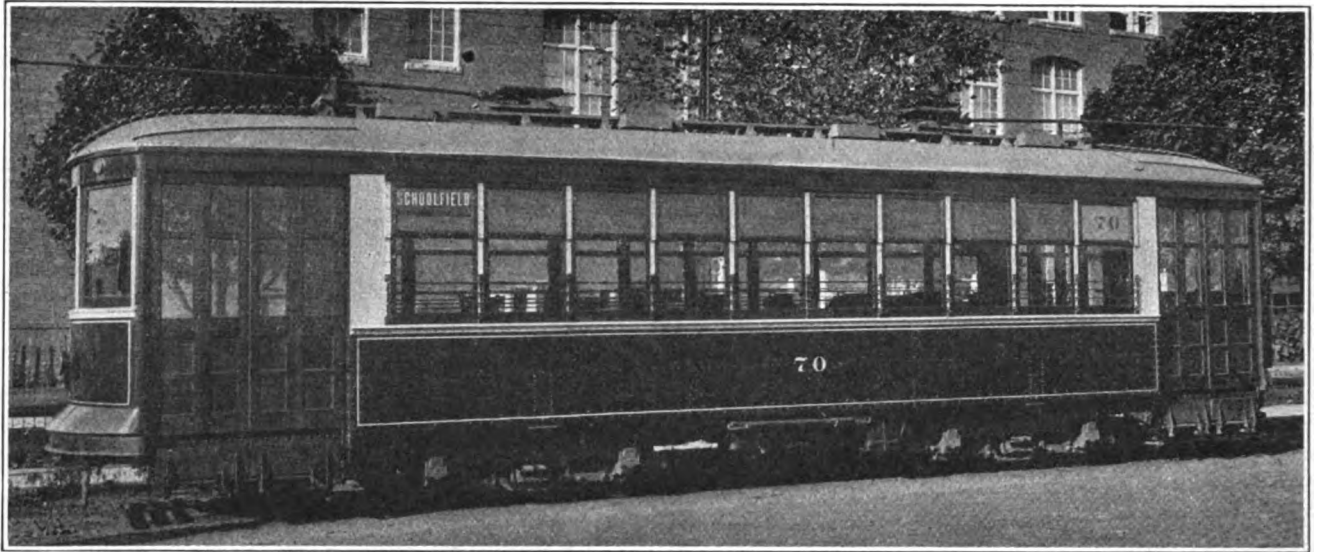
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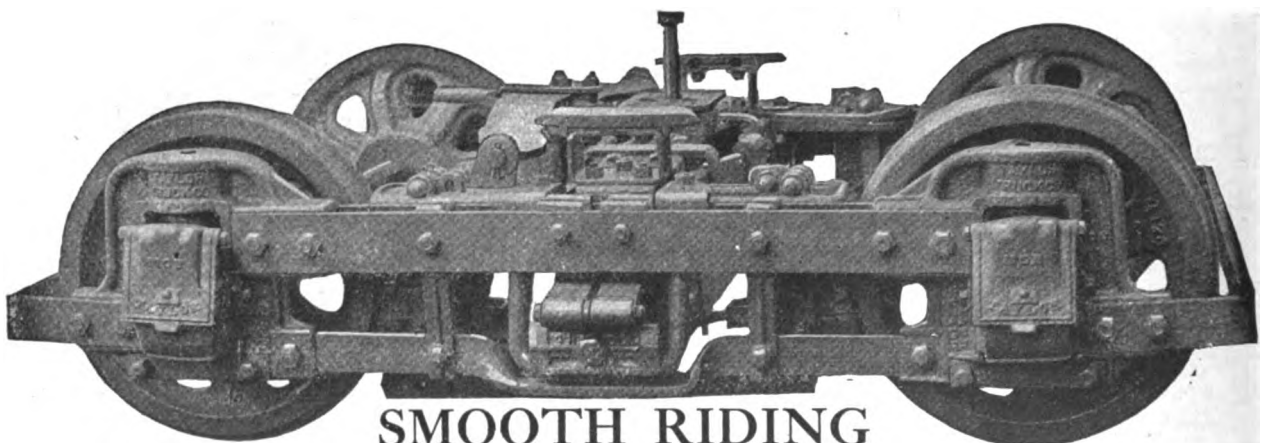
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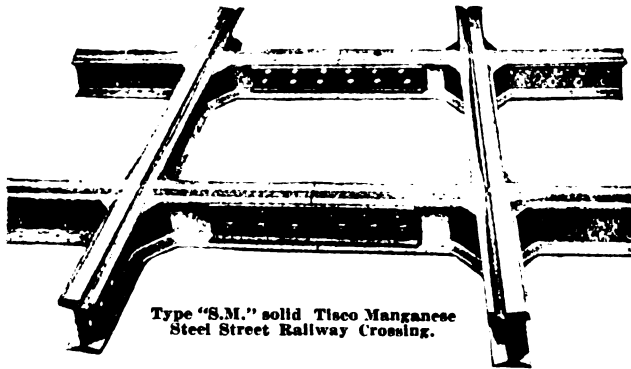
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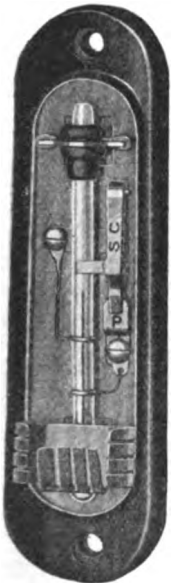
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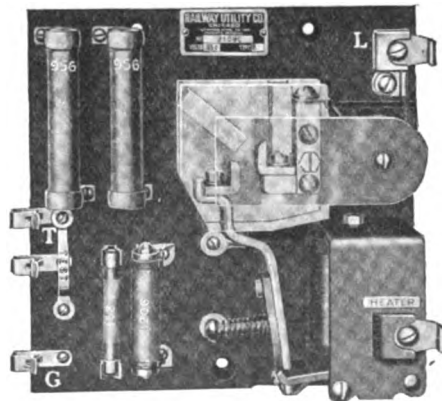
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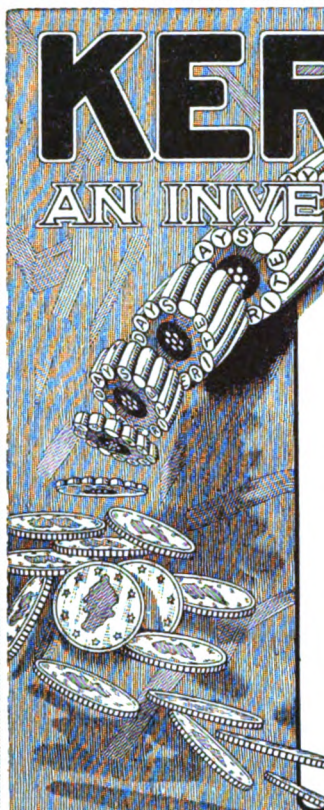


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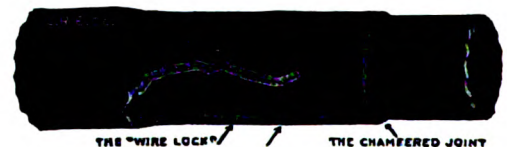
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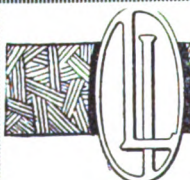
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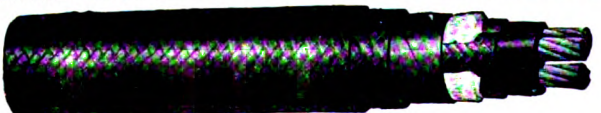
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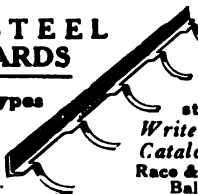
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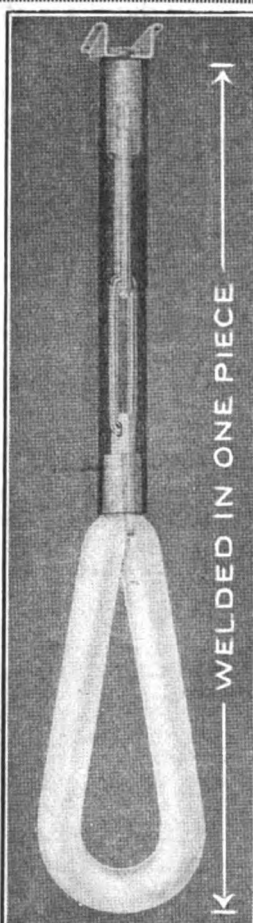
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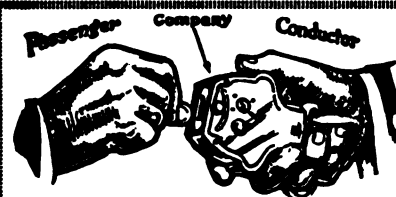
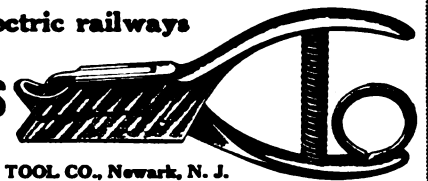
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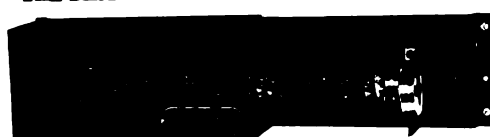
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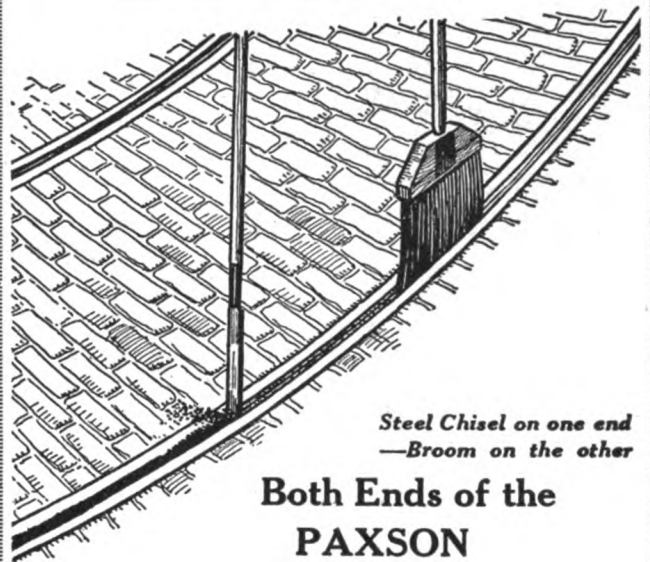


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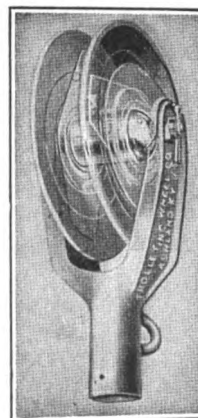
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Mica Insulator Co.

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National Metal Molding Co.

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Bell Lumber Co.
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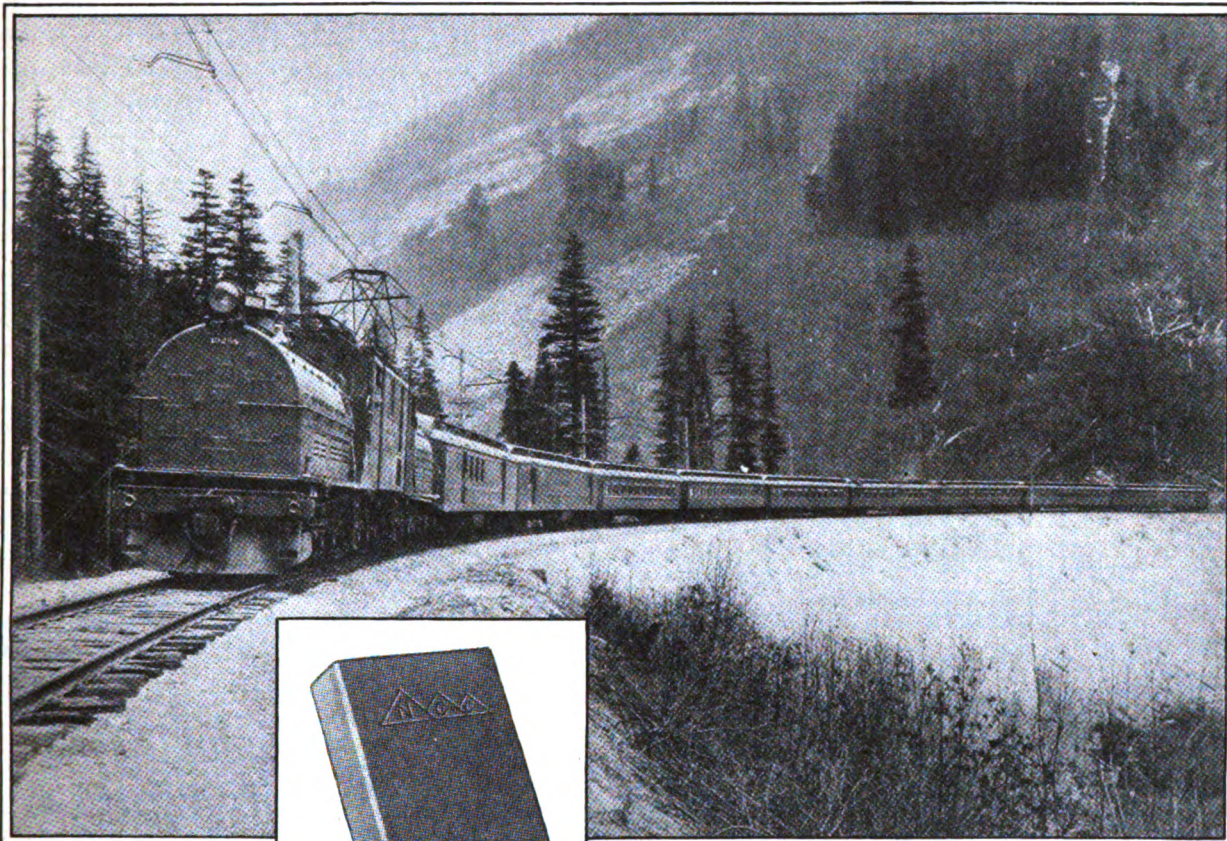
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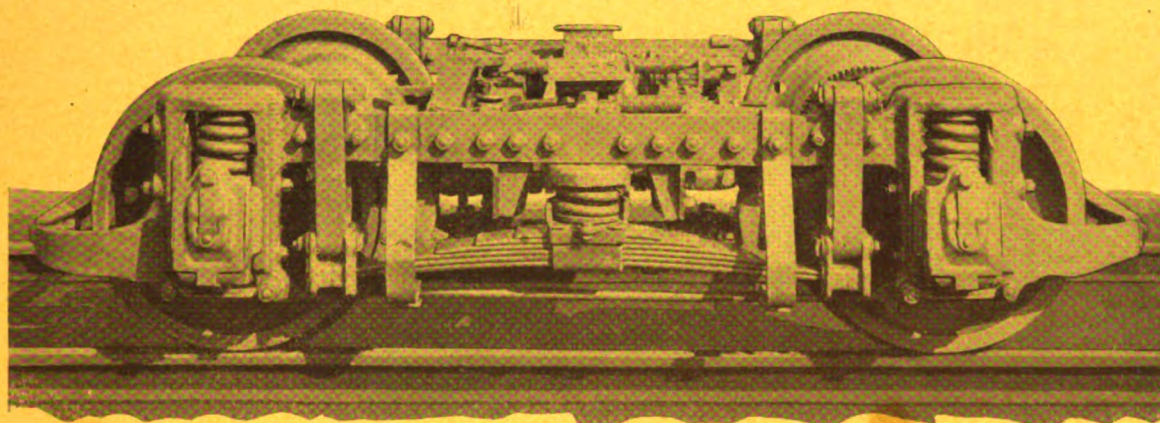
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ALLOY MAKERS SINCE 1899

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Duff Mfg. Co. 78			



The New High-Speed Truck of 1923

One of the foremost achievements of the past year is undoubtedly the adaption of the Brill Light-weight 77-E Truck to high-speed interurban service, keeping pace with the trend toward weight reduction in this field of operation.

Possessing the necessary characteristics for producing the most comfortable riding action, particularly its wide

lateral spring support, which imparts unsurpassed lateral stability, this type truck lends itself exceptionally well to its new field. The use of a new type of link construction and safety straps under the semi-elliptic springs makes it possible for interurban railways to take advantage of the economy and the increased riding comfort resulting from the operation of this type of

BRILL 77-E TRUCK

Light Weight

Riding Comfort



THE J. G. BRILL COMPANY
PHILADELPHIA, PA.



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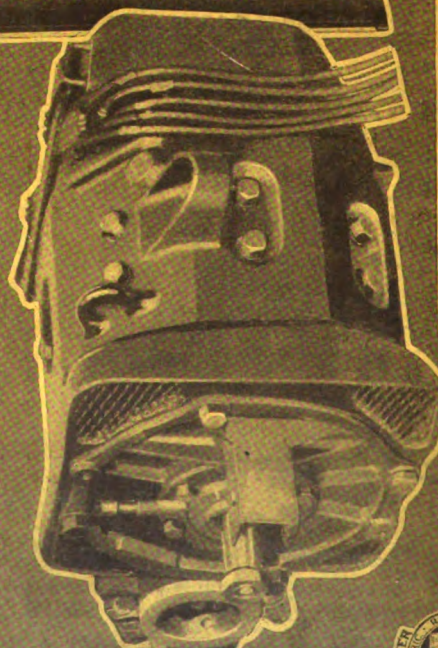
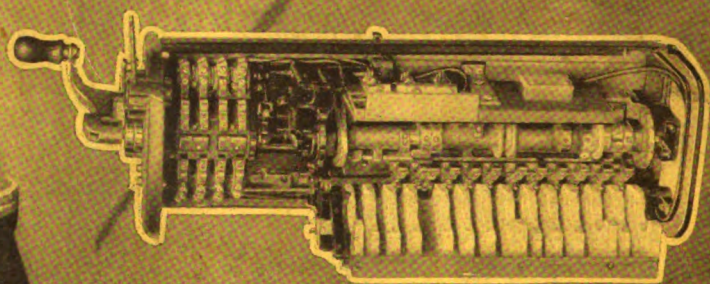
Better Transportation for the Suburbs

In many suburban sections, although traffic may not justify an electric railway system, there is an opportunity in the trackless trolley, which can be installed at a relatively small initial cost. As the community grows, more trolley buses can be operated to keep pace with the increase in traffic until the extension of the track is warranted. In the meantime the trackless trolley system acts as feeder to the main line.

The same G-E equipment which has proved itself on electric railway properties can be adopted as standard equipment for this service. Have you considered the possibilities in the trolley bus?



25-100

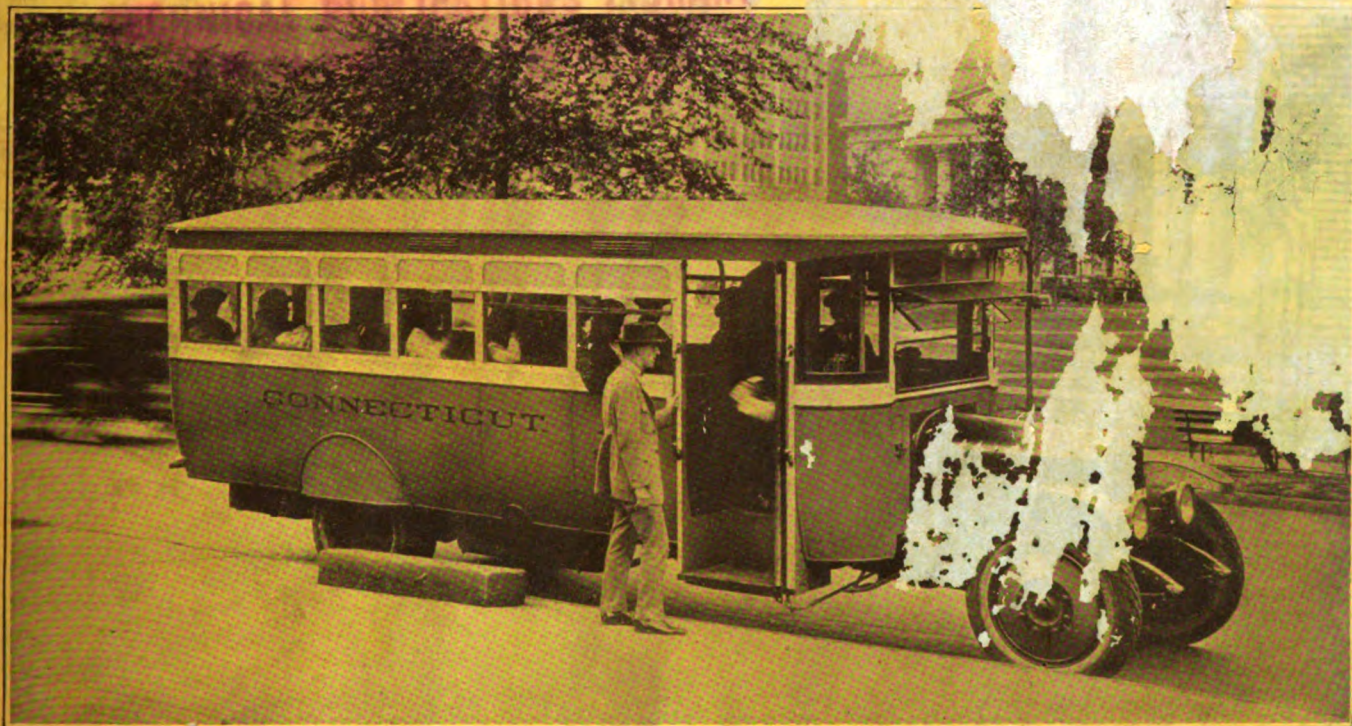


The GE-258 Motor and K-63 Controller are successfully driving many of the trolley buses now in service.



GENERAL ELECTRIC

ELECTRIC RAILWAY JOURNAL



Over One-Half the Busses Operated by Electric Railways are Whites

One hundred electric railways throughout the United States are operating approximately 900 motor busses in city and interurban service to supplement electric traction. *It is a significant fact that over one-half of the busses operated by electric railways are Whites.*

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Excepting certain types in New York and London, the largest bus fleets in the world are White.

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Electric railways operating ten or more White Busses:

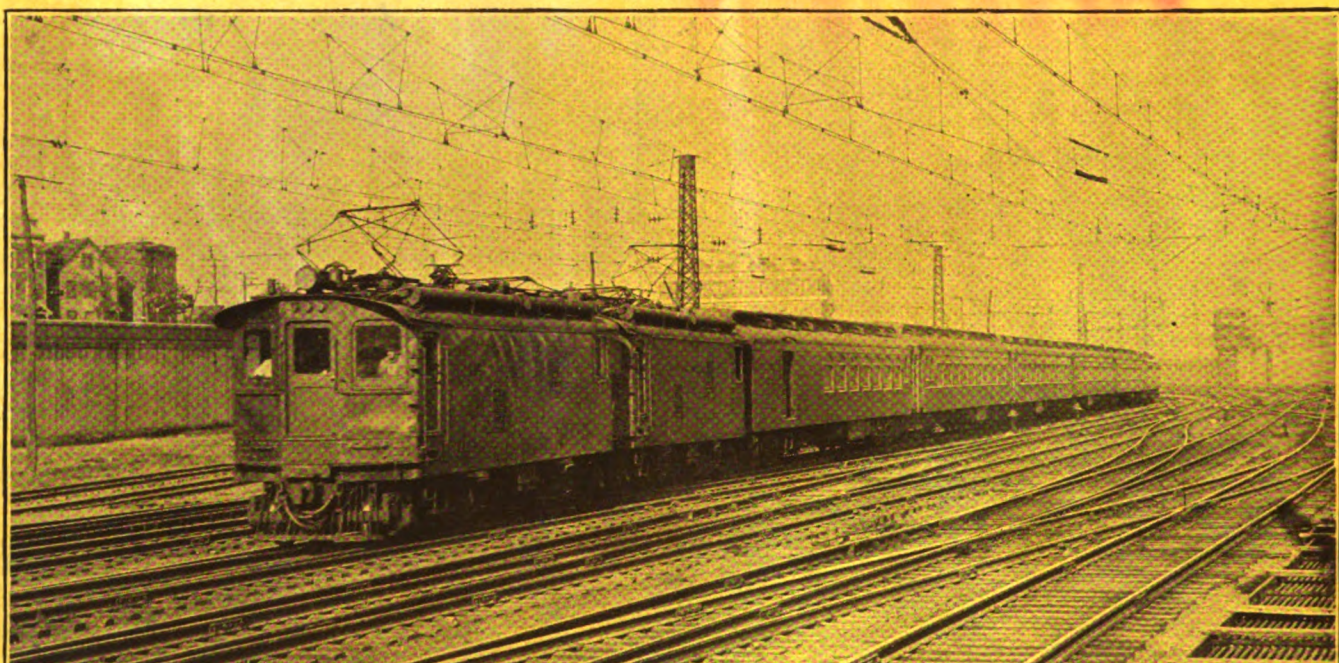
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Chicago, North Shore & Milwaukee R. R.	18	Newburg Public Service Corp.	10
Boston Elevated Railway	14	Northern Transit Co.	11
Pacific Electric Railway Co.	71	Saginaw Transit Co.	14

Bus and railway companies prefer White Busses because they are built to meet the most exacting requirements of passenger transportation. Full specifications, delivery dates, etc., on request.

THE WHITE COMPANY, Cleveland

White Busses

Test Speeds of 100 m.p.h. made 17 years ago—by Baldwin-Westinghouse Electric Locomotives on the New York, New Haven & Hartford Railroad.



Baldwin-Westinghouse Electric Locomotive on the N. Y., N. H. & H. R. R.

17 Years Ago the New York, New Haven and Hartford Railroad placed in service 41 Alternating-Current Baldwin-Westinghouse High-Speed Electric Passenger Locomotives which, to date, have averaged more than 1,200,000 miles each.

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Boiled Tripe

"NOT many people like boiled tripe, yet it will be found on nearly every restaurant menu." So said an editor in defense of a certain article in his paper that was criticized as not of general interest. In fact, it is impossible to interest every reader with every article in an issue if the field is covered well. For there is a wide diversity of interests and occupations in the field covered by most any successful publication. Particularly is this true of the electric railway industry.

The editors of the JOURNAL make it a point to provide something in each issue, in so far as possible, that will be of practical value to each reader, and of course many articles that will be of interest to all.

Evidence comes to us frequently showing that we have succeeded in interesting every reader in each issue. These reactions, following a recent issue, will illustrate:

A railway executive wrote to tell us of a helpful suggestion he found on the editorial page. A manufacturer sent his engineer to New York to discuss with us a statement on the "Manufactures and the Markets" page. A Canadian railway and four American railways wrote in to inquire where certain new equipment described in that issue could be purchased. Several communications were received commenting upon articles which appeared in that issue, two of which expressed differing opinion or gave added information and were intended for publication in the "Readers' Forum."

It all goes to show, we think, the importance of trying to keep the field abreast of developments in every phase of the industry.



Westinghouse Varnish

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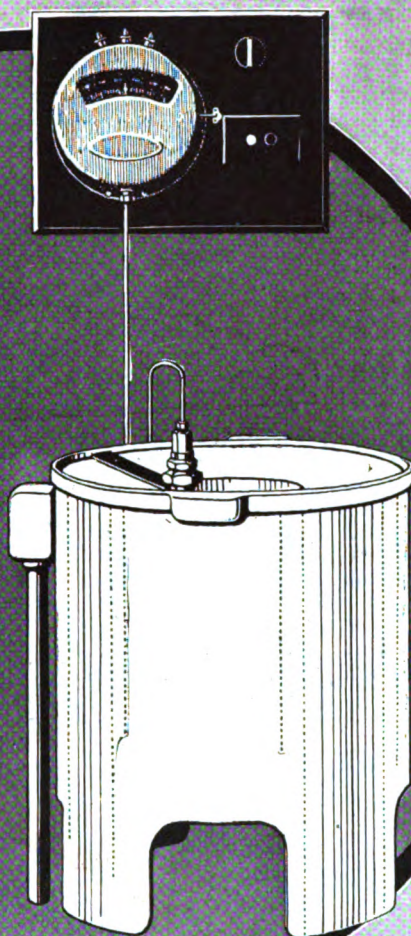
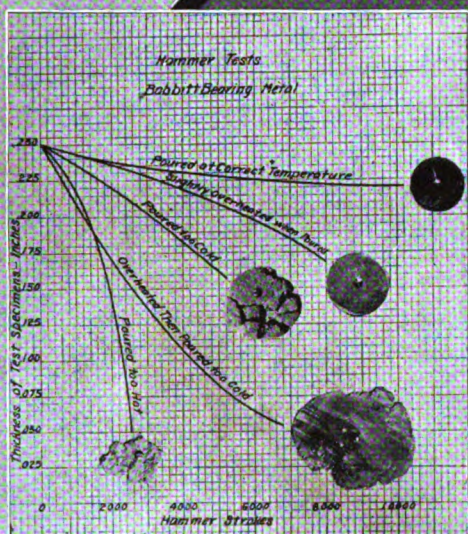
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Westinghouse



Just to show WHAT CONTROL will DO~

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The Westinghouse automatic electric melting pot assures accurate control of this important factor. The metal is automatically maintained at the proper temperature, and a bearing is produced that will stand up under the most severe operating conditions.

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heating apparatus. Designed with characteristic care and attention to details, it has already demonstrated that it will withstand the severe requirements of shop service.

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Westinghouse

There's No Closed Season On Rail Grinding

IT'S an exploded idea that winter damage can't be repaired until spring. More and more maintenance of way is becoming a year-round proposition. Rail grinders, nowadays, work twelve months in the year. Nearly everywhere there are open days even in January and February—days that permit rail grinding. Many successful roads spot rail grinding jobs in advance and order out the grinders whenever weather permits. Keeping joints and special work in good condition saves the track foundation, speeds safe service and satisfies the public. Besides, it keeps track maintenance lower than spasmodic periods of abnormal activity.

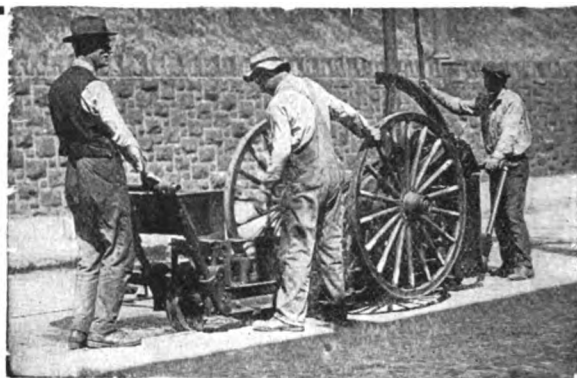
Let us tell you what some of our customers have learned regarding winter rail grinding.

Railway Trackwork Co.

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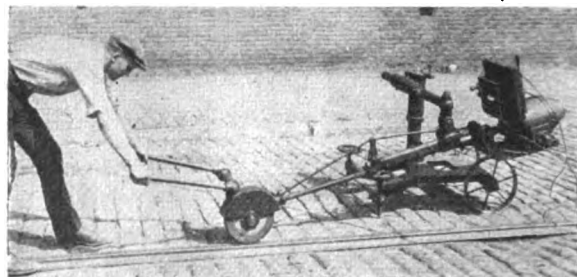
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"Reciprocating" Track Grinder



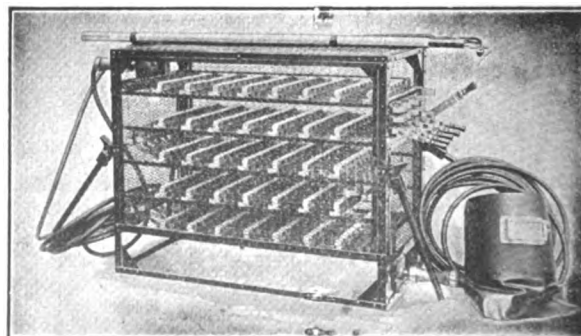
"Universal" Rotary Track Grinder



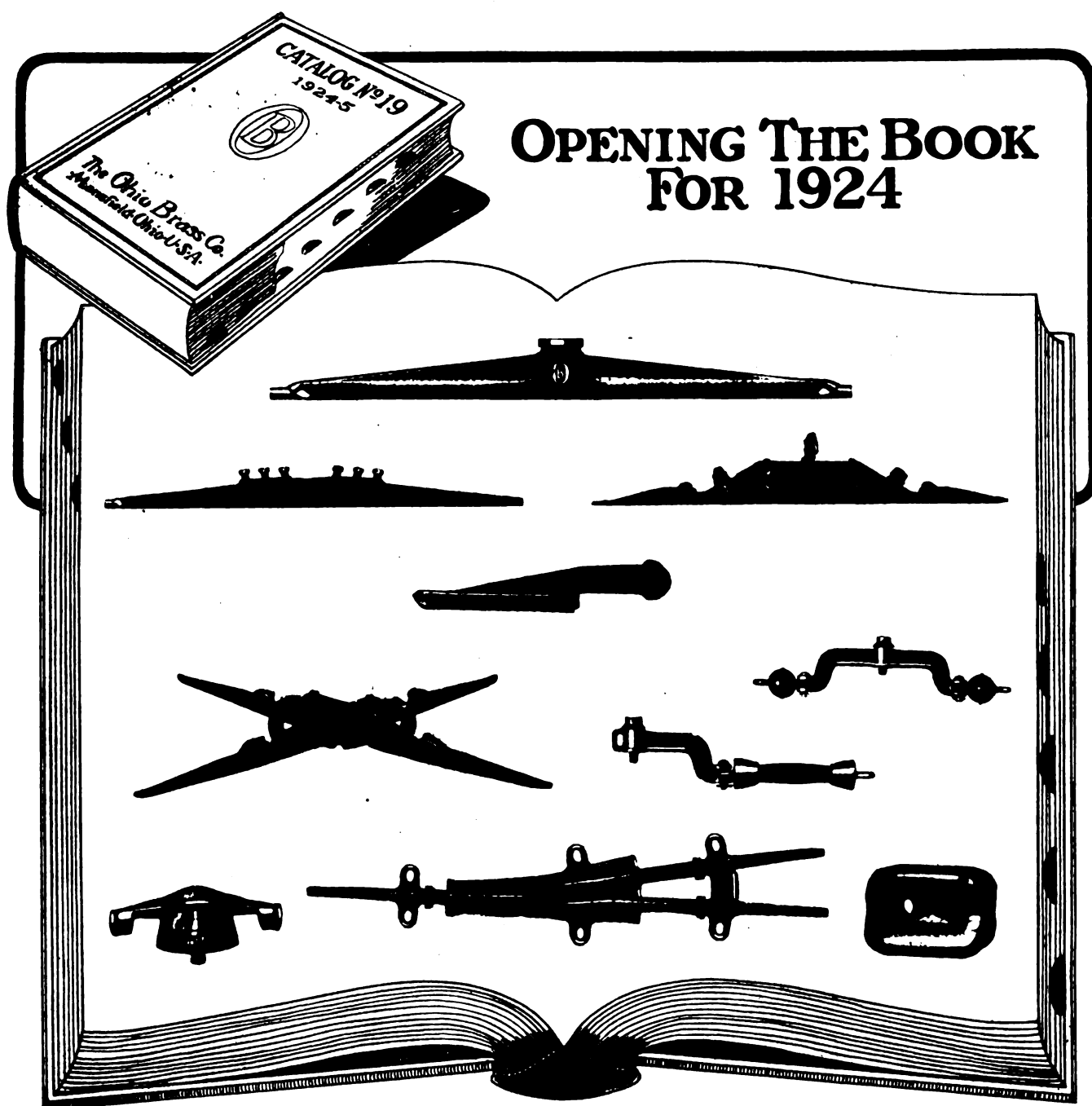
"Atlas" Rail Grinder



"Hercules" Rail Grinder



"Ajax Electric Arc Welder



A Wealth of Suggestions

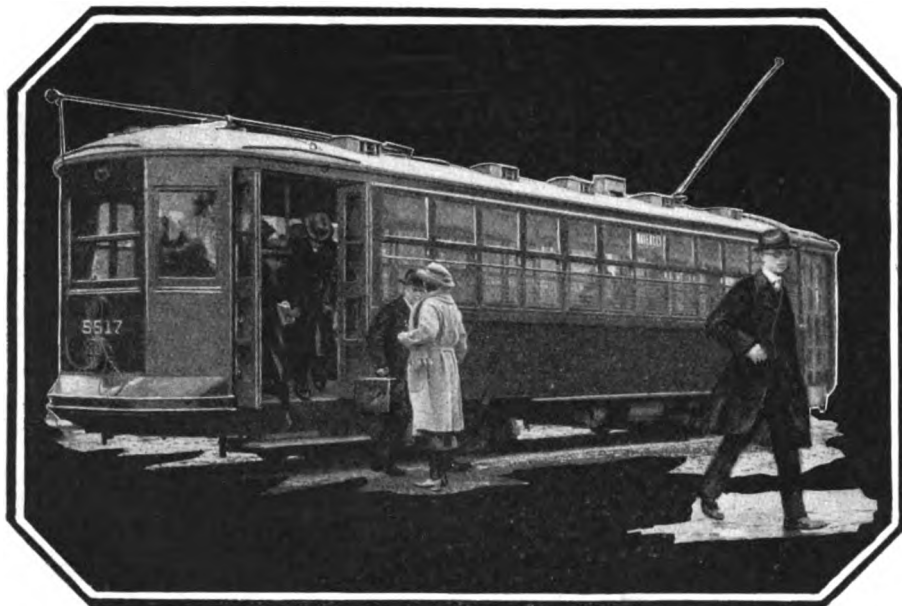
The new No. 19 O-B Catalog (1924-1925 edition) has a wealth of suggestions for you. 160 pages devoted to Line Material—fittings for all purposes—and 60 pages on Catenary makes the job of writing a material requisition easy.

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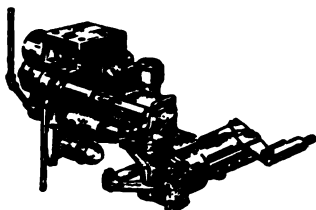
for stock or a complete layout for a new line, there's help for you in these pages.

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The "VARIABLE LOAD" BRAKE *as applied to light-weight surface cars*



THE VARIABLE LOAD BRAKE

The Westinghouse Variable Load Brake has been developed to solve the problem of controlling cars under widely varying load conditions. It is an attachment which may be added to any straight air or semi-automatic equipment whereby the braking force is automatically adjusted to suit the weight on the car, by regulating the brake cylinder pressure as the weight changes. The adjusting mechanism is thrown into engagement by the opening of the car doors. While the doors are open, passengers are leaving and entering the car, and when the doors are closed again, the condition of loading will be that under which brake operation will take place for the next stop, or a slow-down, as the occasion may demand. The use of the Brake insures stopping within a uniform distance regardless of whether the car is empty or loaded.

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As the ratio of live to dead weight increases, the stopping ability of a loaded car diminishes, and the stopping distance (or time) is materially lengthened, *if ordinary brakes are used.*

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Short, uniform stops mean a saving of time and a speed-up of car schedules—increased mileage; increased earning power—especially in congested districts.

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General Office and Works: WILMERDNG, PA.

WESTINGHOUSE TRACTION BRAKES

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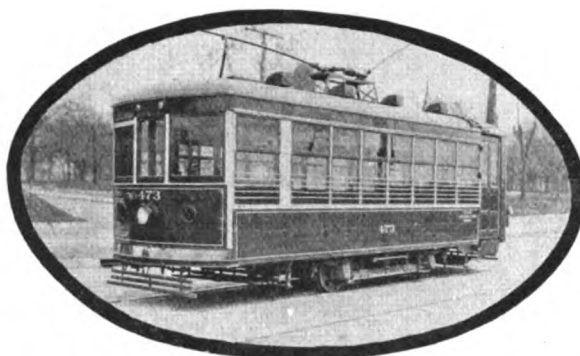
The price disparity between wood and Steel Twin Ties is gradually disappearing; since 1914 when one Twin Tie cost as much as eight wood ties to the present time when one Steel Twin Tie can be bought for less than the cost of three (prime quality creosoted) wood ties. In other words as one Steel Twin Tie takes the place of three wood ties the Tie cost per foot is now the same.

Of course, in individual instances wood ties are lower in cost than the quotation used above, but on the other hand no allowance has been made for the other savings in grading and ballast possible with Twin Tie Construction.

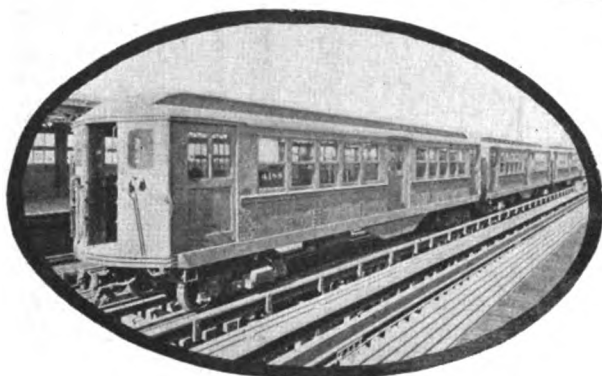
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**The
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Cleveland, Ohio**

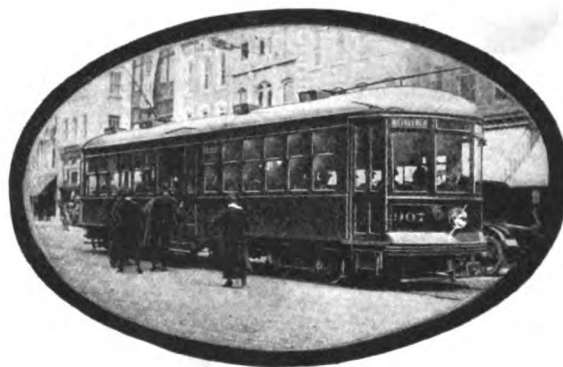
Steel Twin Tie Track



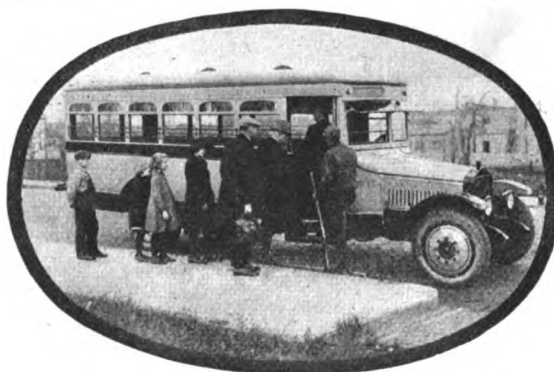
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Only a few of its items are listed above. 688 pages covering the widest range of parts and supplies for car construction, maintenance and repair. Accessories also are included.

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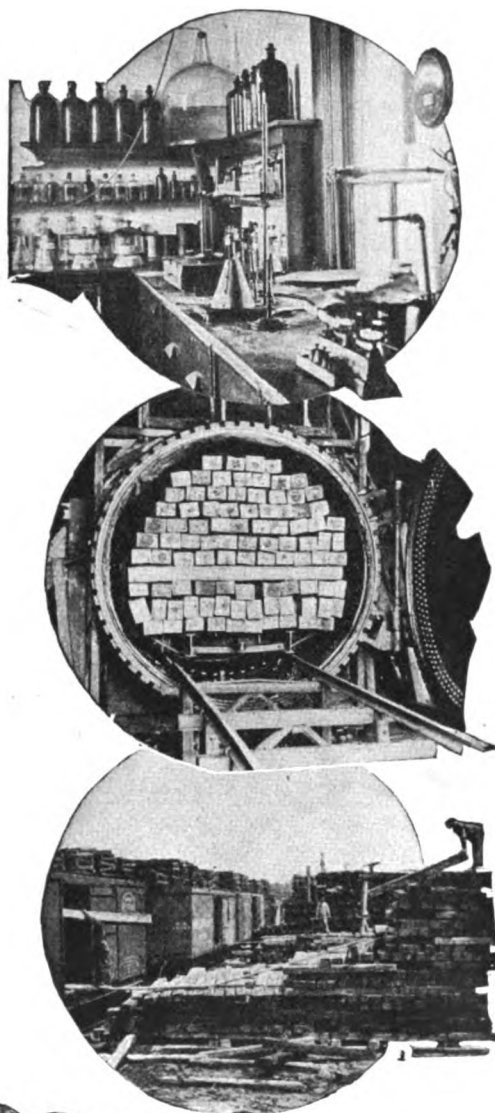
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Rialto Building,
San Francisco, California.

Dear Sir:

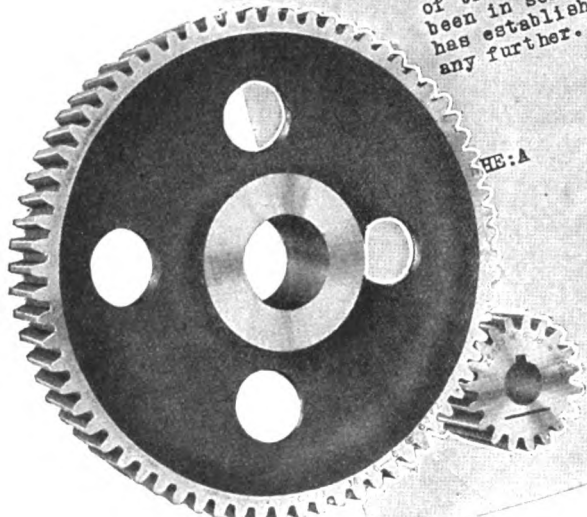
I enclose for your information carbon print of GE pinion 115134 installed on a GE-222-G motor (40HP) operating on our car 201.

This pinion went into service, together with the equipment, in July, 1915, and has made in the neighborhood of 400,000 miles, being the first grade "M" material which we used on our system.

Apparently, from the small amount of wear shown on this pinion and the other gears and pinions on this car, it is hardly worth while in going to any great amount of trouble to keep mileage records, as material which has been in service for seven years and is still operative has established a record which hardly requires checking up any further.

Yours very truly,
W. H. Evans

HE:A




IT is the mileage records back of testimony like this which have made Grade M Gears the more-miles-per-dollar gearing.

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Schenectady, N. Y.
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GENERAL ELECTRIC

New York, January 12, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, Editors

Volume 63
Number 2

Baiting the Vote Hook in Illinois

EQUITABLE decisions, serving the best interests of both the public and the investor in utility securities, are insured when the personnel of state regulatory commissions is appointed on the basis of training, experience and general fitness for such positions. When these commissions are allowed to function without political interference, fair and constructive action has nearly always resulted. But the game played by spoils politicians exerts a degenerating influence on the commission form of regulation. Not only does it require appointments to be carefully distributed in accordance with vote-producing power, regardless of any other qualifications, but the politician-commissioner is usually so securely bound to the patronage-fed political machine, that these ties effectually strangle any impulse toward fair and constructive rulings.

The Illinois commission has done and is doing a great deal of constructive work. In recent years, however, its members have been handled very much as chess men, to be maneuvered about in accordance with the exigencies of the political game. The latest move has been the appointment of a negro as a member of the Illinois Commerce Commission. As a political maneuver to help Governor Small control the negro vote of the state it was probably far-sighted, but it is very doubtful if the best interests of the people of Illinois were the main consideration when weighing the qualifications, experience and influence of the new appointee.

New York Transit Lines May Extend in New Jersey

THE suggestion of the New York Transit Commission that the Interborough Rapid Transit System be extended by two lines from downtown Manhattan to New Jersey is in line with correct principles in city transportation. To secure economy in operation through a balanced load, trains should be routed through the business section of a community. Heretofore, state boundaries have been considered a barrier to the extension to New Jersey of a transit system built by money advanced by the city of New York. The result has been that these lines have been constructed within the city limits north, east and southeast from Manhattan Island, but with no outlet to the west. There has been some opportunity to balance traffic through the lines to Brooklyn, Queens and the Bronx, but no use has been made for this purpose of the vast army of commuters who do business in lower Manhattan but live west of the Hudson River.

To some it may seem anomalous that a purely municipal enterprise should extend its activities beyond

the limits of the city and indeed of the state, but the principles of engineering are not changed by political boundaries. The municipal tramway systems of Great Britain found that they had to extend beyond the city boundaries to obtain best results, and there is no reason why the city of New York should not follow their example. The Port Authority, the interstate vehicular tunnel and the interstate park furnish precedents. The method of political control for such transit extensions may present greater complications than in the case of any of the earlier interstate undertakings mentioned, but this obstacle should not prove insurmountable. The citizens of New York City and of its New Jersey suburbs should not allow the possible conflicting interests of state politicians to stand in the way of such a real transportation improvement.

A Half a Loaf Is Better than No Bread

ONE of the most serious questions in the electric railway industry today relates to the preservation of the small city property. In a large city a great proportion of the riding is compulsory. The streets are too congested for much private automobile service, and the distances are too long to make walking a serious competitor of car riding. Hence, unless politics prevents the charge of an adequate fare, the road can usually be made to pay. Traffic may fall off slightly with an increase in fare, but even the largest increase in street railway fare which has been made in this country is small compared with either the service given or the increase in price of most of the commodities which the public has to buy. In consequence, at any fare up to 10 cents, or perhaps more, there is no danger that there will be a permanent falling off of any considerable amount of patronage on the large city railway.

But with the road in a small city, say with a population of from 25,000 to 100,000, conditions are almost reversed. In such a city automobile driving into the center of the community is not only possible, but there is often ample parking space. Moreover, the private auto usually provides not only quicker service than the trolley, but exclusive service, which most automobile owners think more of than they do of the higher cost of riding to business in their own cars. Finally, the distances in the small city between most points are so short that walking is possible for a great many trips, and if the car headway is at all infrequent walking is often the quicker way of getting from one point to another.

What should a railway do in these circumstances? Well, it can do a number of things. If there is jitney

competition it can secure its reduction. It can reroute its cars if a study of the situation shows that to be desirable, and it can usually increase their schedule speed. It can employ one-man operation if that has not been done. It can discourage the use of private automobile by argument, so far as that is possible, and it can cultivate good public relations in a variety of ways. Finally, if these do not suffice, it can increase its fare.

But suppose that the railway company has done all these things and has reduced its operating expenses and increased its headways and its fare to the danger point, but still the income from operation is inadequate to pay a reasonable return on the investment. What can it do then, to be saved? This is not a purely hypothetical condition. It is a very real problem on a number of properties.

It is easier to answer the question what not to do in circumstances of this kind than to tell exactly what to do. The main thing not to do is not to get discouraged. Conditions like this cannot last always. It may be that in existing circumstances the investment in the property was unwise, but these conditions may change. The private automobiles in the city may become so numerous as to compel the passage of laws curbing their use or the extent of their parking in the downtown streets. There may be such a reduction in general wages as again to bring the operating ratio of the railway company to a reasonable figure. The city may grow so much as to make car riding necessary to many who now walk. In the meantime, if a reasonable return is not earned, the security holders should prefer a low return to none at all. If the road is abandoned, they certainly will at the best get very little of their money back.

Many manufacturers in dull times keep their factories going to avoid a greater loss. A railway in the condition described should realize the truth of the old adage that half a loaf is better than no bread.

Right Follow-Up Will

Reduce Accidents of New Men

REVIEWING the accident statistics of a large street railway property recently it was clearly evident that new men are most likely to be involved in serious accidents after they have been in service for periods ranging from two months to one year. Experience of this company has also demonstrated that a new man who has one or two minor accidents during his early experience is less likely to have a really serious accident due to carelessness, than is the man who has been entirely free from accidents for several months, after first going into service.

Psychologically, the condition is probably explained thus. After the initial period of training has been completed the new man is keenly alert because of the newness of the work. As he becomes more accustomed to the job this work becomes more and more automatic. If he is fortunate enough to escape minor accidents during the first two or three months, his increasing self-confidence is very likely to be accompanied by a tendency toward carelessness. When this occurs the scene has been set, it seems, for a serious accident. On the other hand a minor accident or two early in the new man's experience brings him to a more permanent realization of the hazards.

A properly designed course of follow-up, or supple-

mental instruction for new employees, should therefore take the man back periodically over the fundamentals of correct and safe operation so as to overcome this increasing tendency toward carelessness, as far as possible, before his bad accident occurs. To this end a very important part of the safety man's work on a railway property is the study of the causes of accidents in which new men are involved, with a view toward developing charts and talks to form the basis of an instruction course that will carry the new man along progressively until he can be rated as an experienced operator. Even then, of course, experience has shown that continued effort in keeping the subject of safety in the limelight gives handsome returns in the form of reduced accidents.

Training Platform Men for Present-Day Conditions

CAR operation under present-day street traffic conditions is a very different problem from that of only a few years ago, and its bearing on the subject of trainmen's instruction is worthy of careful consideration. In many cases the course of instruction now being given to new men was prepared when traffic conditions were very different from what they are today. As a result, the period of training may be too short to prepare new operators safely to cope with modern street conditions, or some practices taught may be altogether out of date. A rule book containing many obsolete paragraphs or clauses, or failing to cover important new items, tends to lower the entire book in the respect of the trainman.

There also have been many developments and changes in car equipment. Among these is the requirement that both motormen and conductors must handle equipment. Developments in door operating apparatus and brake and control equipment are other examples. The increasing use of train operation in the form of motor car and trailer, or motor units equipped with multiple-unit control, have brought new operating problems that should be adequately covered in the course of instruction for new men as well as in instructions issued to old crews.

Material physical damage to new equipment sometimes has resulted from putting it into service in charge of men who, though old in the service, perhaps, were not properly instructed relative to its operation. Aside from the resulting repair bills, such practice causes serious operating delays and consequently the new equipment makes a bad initial impression on the public where a good impression was most important. In such cases the trainmen got the blame but it really belongs on the shoulders of the company officials who did not give the matter sufficient attention.

In addition to the need for more thorough and more appropriate training which is brought about by modern traffic conditions and new equipment, the close contact between the platform man and the traveling public makes his training an exceedingly important factor in the all-important question of establishing and maintaining favorable public relations. Thus liberal expenditures of time and money in the more thorough instruction of new employees would seem to be well justified. The opportunities available for improvement commend the subject to the attention of progressive managements.

Passenger Comfort the Feature of the New Chicago "L" Cars

Although Low First Cost and Maintenance Were Considered, the Car Rider's Convenience Has Precedence—Plush Seats, Liberal Ventilation, and Insulation Against Noise and Cold Are Features—Wood Roof Considered Necessary for Overhead Trolley—Steel Headlining and Sub-Floor Reduce Fire Hazard

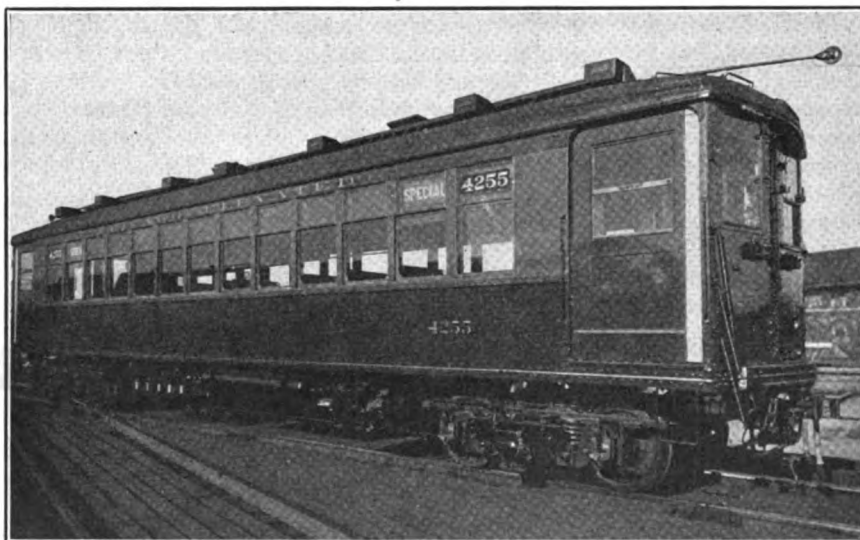
SAFETY and comfort of passengers have been the primary factors considered in the design of the new steel motor cars recently put in service by the Chicago Elevated Railroad. Although careful attention has been given to the design of the car structure and its apparatus, to secure low first cost and low maintenance, the comfort and convenience of passengers was made the controlling consideration. This policy is reflected both in the construction of the car itself and in the selection of its equipment. The psychological factor in winning public approval and good will has been taken into account and the appearance and finish of the cars were given careful thought.

The interior trim is in natural mahogany. Where steel panels or posts are exposed in the interior they are stained and grained to imitate the other finish. The headlining is painted a light cream color and is paneled with mahogany moldings. The steel curtain molding, stained to match, is made up in a simple and pleasing shape. It is formed at the upper edge to hold the advertising cards. This molding is carried across the bulkhead panel so as to carry out a stream-line effect on the interior. The curtains are made of double-faced Pantasote with Railway Supply & Curtain Company rollers and fixtures. Electric Service Supply Company roller signs are installed in the four corner windows of the body.

There are eighteen Hale & Kilburn reversible cross-seats spaced on 32½-in. centers, which corresponds with the spacing of the side posts, so as to give a full window opening at each seat. Longitudinal seats at the four corners of the body provide additional space for sixteen passengers, making a total seating capacity of fifty-two. The seats are of full spring construction and are upholstered in high-grade green figured plush. The slope of the backs was carefully considered from the standpoint of comfort, and with this point also in view the longitudinal seat cushions are tilted so as to make them as comfortable as possible.

The illumination in the body is furnished by twenty shaded 23-watt lamps installed in three rows. Two rows are spaced approximately over the centers of the cross-seats and the third is in the middle of the car. A separate circuit furnishes the illumination for vestibules and cabs. Four battery lamps in the body are controlled by a no-voltage relay, when the power supply is off, to keep the car from being in darkness.

Twenty-four Consolidated electric heaters of 630



Sliding Doors Are Protected by Reversing Shoe on Edge

watts capacity each are controlled by Utility thermostat equipment. In addition a 1,200-watt heater is installed in each motorman's cab. Although the Chicago ordinances require a minimum temperature of 50 deg. F. for the interior of cars, the thermostats have been set to cut the heat in at 58 deg. F. and out at 60 deg. F., with the idea that this temperature would be most comfortable for passengers in long-haul elevated service.

Grab handles are conveniently placed to give security and convenience to standing passengers, and the leather hand straps of the customary type have been replaced by rigid overhead grab handles of the "Rico Steelkar" type, arranged to spring back out of the way when not in use. These handles and their supports are finished in white enamel.

FLOOR INSULATED AGAINST NOISE AND COLD

Composition floors used on previous steel cars proved unsatisfactory on account of their coldness. On these new cars, therefore, a double wood floor was used. This consists of a layer of 1½-in. tongue-and-groove yellow pine beneath, laid crosswise, with 1½-in. x 2½-in. tongue-and-groove maple above, laid longitudinally within the body and crosswise of the car in the vestibules. To insure a comfortable temperature and also to prevent the transmission of noise to the interior of the car, a ½-in. layer of compressed hair insulating material is laid between the steel underframe and the lower wood floor. In addition, two thicknesses of building felt are used between the upper and lower wood floors. Aisle strips are formed by rabbeting the top floor boards both on the interior of the body and in the vestibules. At the door thresholds these rabbeted grooves are tapered up flush with the top

of the floor so as to facilitate cleaning. Safety treads are used at all door openings, and in addition a leather mat is set into a brass casting located at each sliding door, designed to drain off water and keep the car floor as clean as possible.

Liberal provision is made to insure good ventilation. Two Utility automatic air intakes are located at each end of the body, so arranged that the intake grilles are mounted in the body headers. There are two additional intakes at the center of the body. This equipment is designed to draw in air when the car is moving in either direction. Four Utility exhaust ventilators are spaced on the roof along each side of the car between the intakes. Carrying still further the policy of providing the maximum of comfort to passengers, each car is equipped with two oscillating fans mounted on the bulkhead headers and operated from the 32-volt storage battery.

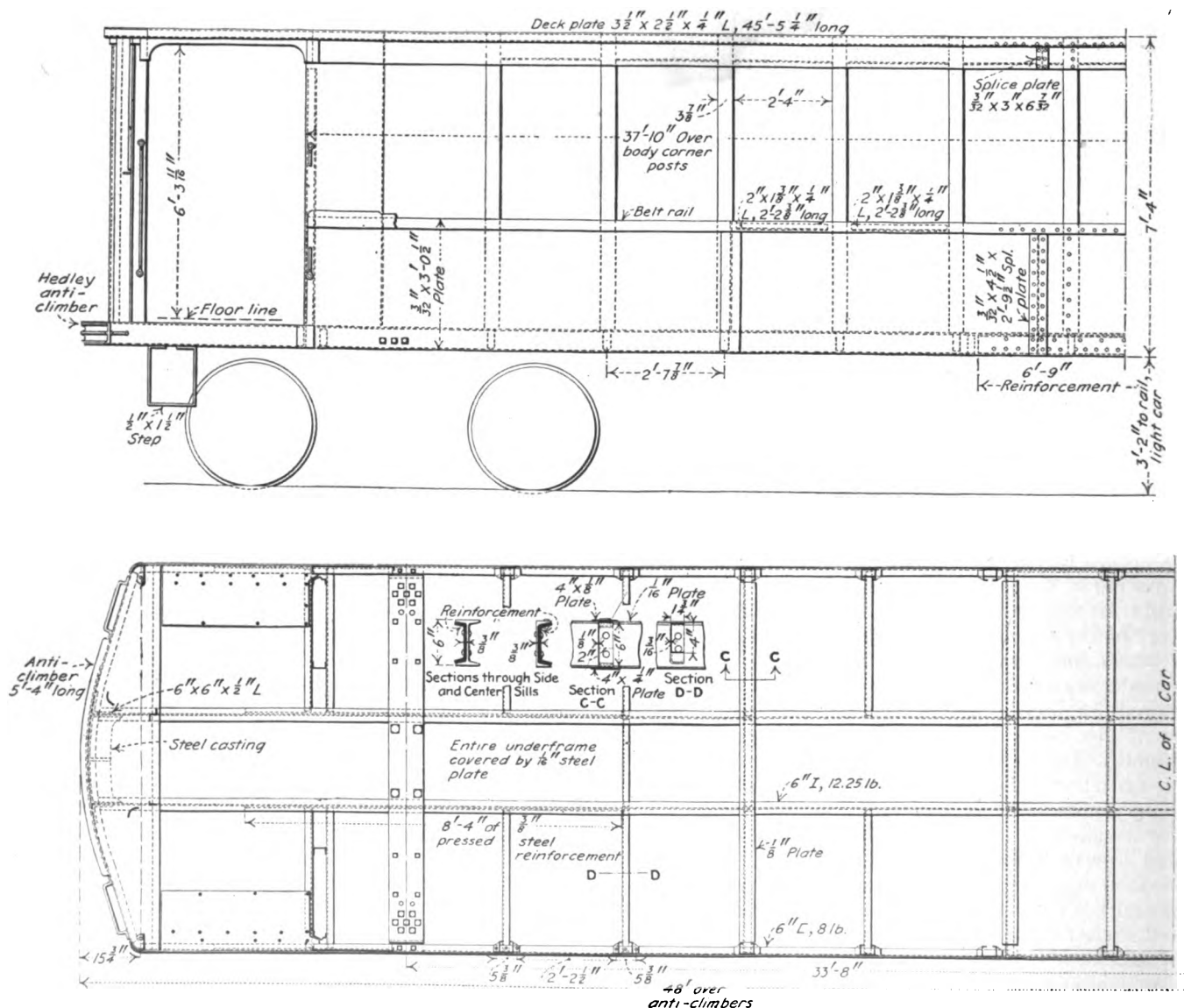
Operation of these cars on the Evanston branch of the Northwestern line and on the Oak Park division requires overhead trolley equipment. The roof therefore has been made of wood to insure proper electrical insulation. The construction, however, has been designed to be as nearly fireproof as possible under these conditions. To this end the headlining is made of $\frac{1}{4}$ -in. steel. For the same reason a sheet of $\frac{1}{4}$ -in. steel covers the entire under-

frame structure below the wood floor, protecting the car against fire and tying the underframe members together in place of using the customary type of diagonal bracing.

THE CAR FRAMING IS OF RUGGED CONSTRUCTION

The underframe itself is designed to withstand impact incident to coupling of long trains, and is also reinforced longitudinally to prevent excessive damage in case of collision. The built-up body bolsters are made with a $\frac{3}{4}$ -in. x 9-in. mild steel upper plate and a 1-in. x 9-in. bottom plate, separated by a steel casting at the center with an extension which is riveted to the center sills, forming an anchorage for the draft gear. The center sills consist of two 6-in. x 12 $\frac{1}{2}$ -lb. I-beams in one continuous length between bumpers and spaced on 24-in. centers. These are reinforced at the bolsters by 8-ft. 4-in. sections of $\frac{3}{8}$ -in. pressed-steel channel riveted to the I-beam.

Continuous 6-in. x 8-lb. channel side sills are run from bumper to bumper. These are also reinforced with sections of $\frac{3}{8}$ -in. pressed-steel channel, both between the bumper and bolster and at the center of the car. The bumpers are 6-in. x 8-lb. channel and are reinforced with anti-climbers 5 ft. 4 in. long riveted to the outside. A $\frac{1}{4}$ -in. thick plate, 19 in. wide at the center, is riveted



Plan and Elevation of the Framing of the New Chicago "L" Car

across the tops of the bumper, center sills and side sills. A second plate $\frac{1}{2}$ in. thick by 17 in. wide at the center is riveted across the bottoms of these members. Four main cross-sills are spaced in the underframe between bolsters, and consist of 6-in. x $\frac{1}{2}$ -in. pressed-steel channels riveted in three sections between the side and center sills. These cross-bearers are reinforced above by plates of $\frac{1}{2}$ -in. x 4-in. material and in addition by $\frac{1}{4}$ -in. x 4-in. plates below. The upper reinforcing plates are riveted through the $\frac{1}{4}$ -in. floor plate, which is first laid directly on top of the underframe members. Intermediate floor supports are made of $\frac{1}{4}$ -in. x 4-in. pressed-steel channels carried between the side and center sills.

PRESSED-STEEL POSTS AND BRASS SASH USED

Pressed-steel side posts of a plain box type, spaced on 32½-in. centers, are made of ½-in. material, flanged at the top and bottom. These are riveted to the side sills below, and to the ½-in. x 2½-in. x 3½-in. body side top-plate angles above. Sash and curtain guides are formed of brass angles fastened to the side posts as shown on the accompanying cross-section drawing. Both the top and bottom sash are brass, the top sash being set in between the posts and held in place by an angle-shaped batten fastened to the post and clipped under the bottom rail of the upper sash. O. M. Edwards sash locks and compression devices are used on the lower sash.

Both the side girder sheet and the letterboard are made of $\frac{3}{4}$ -in. steel. The belt rail is a $\frac{1}{2}$ -in. x 3-in. bar, capped with a rolled-steel section $\frac{1}{2}$ in. thick, supporting the mahogany arm rest.

PROVISION IS MADE FOR POSSIBLE ADDITION OF CENTER DOOR

As the center doors on the existing elevated cars are not used, it was considered desirable to build the new cars without center doors in order to provide more comfortable cross-seats in the middle of the car. This also gives an unobstructed window construction. The framing has, however, been arranged on the new cars so that a center door may be added if desired in the future. To this end the side girder sheet and letterboard are spliced at a point where the center door opening would be made; the side sills are reinforced below this section, and reinforcing angles have been installed on the belt rail adjacent to the section in which this opening would come. To install center doors it would only be necessary to remove the sections of the girder plate and letterboard, take out the side posts and install posts for the door pockets. All necessary reinforcing has already been put into the body structure.

Still further to insure comfort and freedom from noise, insulating material has been applied to the interior of the steel frame. A layer of $\frac{1}{4}$ -in. Agasote is fastened to the inside of the letterboard, and a $\frac{3}{4}$ -in. layer of compressed hair insulation is fastened to the inside of the side girder plate. Compressed hair $\frac{3}{4}$ in. thick is also put into the roof above the headlining. The inside lining below the arm rest consists of Agasote, painted and grained to match the mahogany interior finish. Back of this lining a $\frac{3}{4}$ -in. x 9 $\frac{1}{2}$ -in. seat mounting board is carried between side posts. This construction is designed to insure a secure fastening for the cross-seats. To guard further against loose seats, the pedestals are bolted through the floor and the $\frac{1}{4}$ -in. plate beneath.

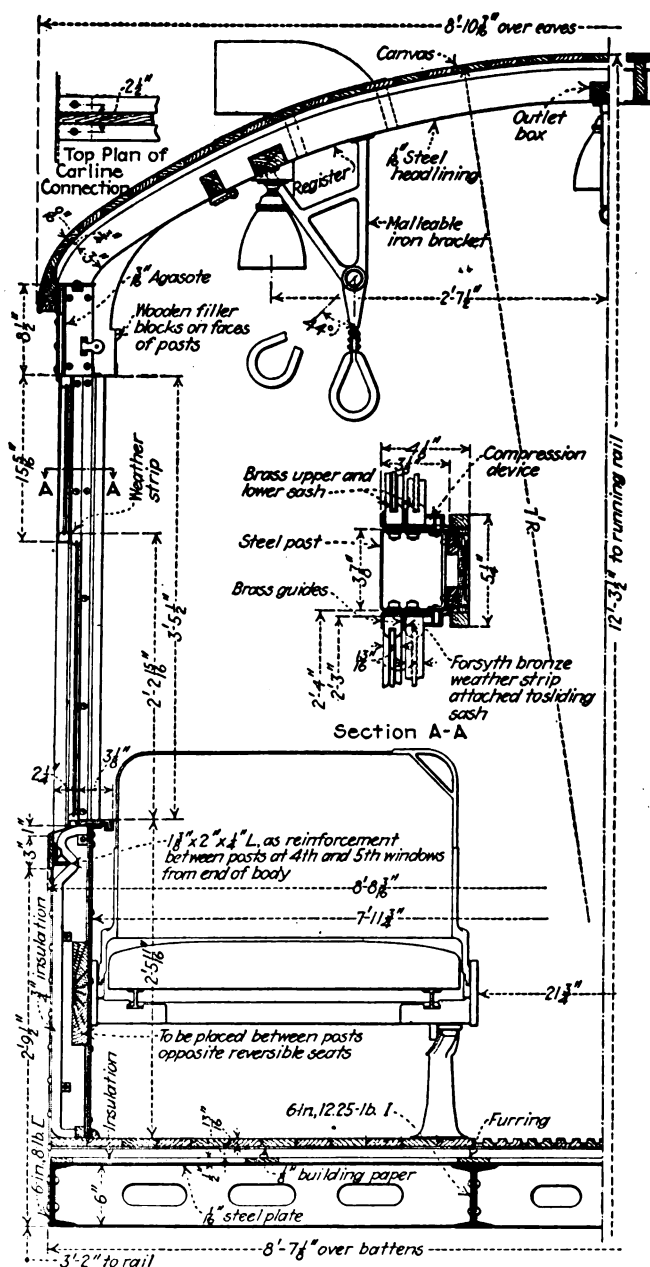
The control equipment is mounted in the right-hand

corner of each vestibule. The apparatus is inclosed between the dash and a swinging door, which when closed serves as the end wall of the vestibule and protects the apparatus against tampering. This swinging door when opened engages a small swinging panel mounted on the body end panel, and thus forms a cab.

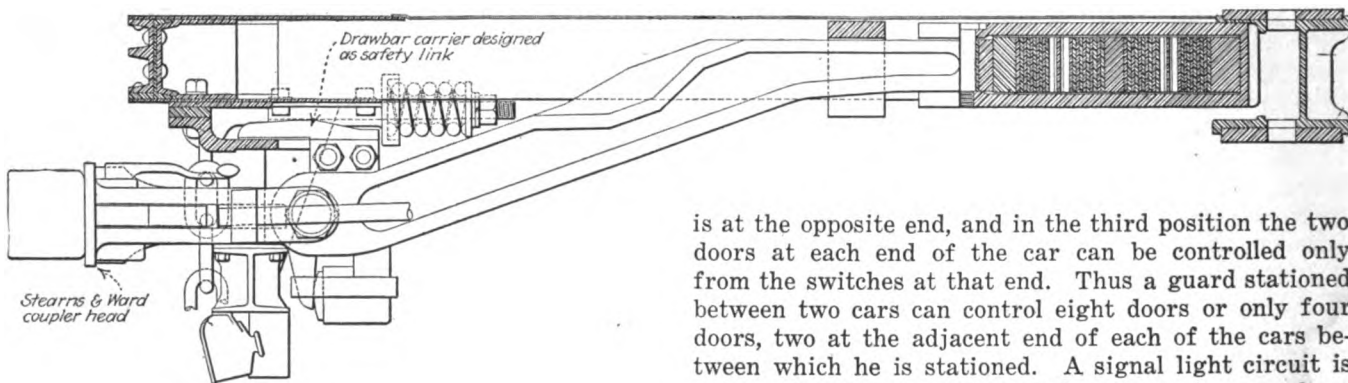
In addition to the master controller, brake valve and air gage, a cab heater, a push-button switch for controlling the adjacent sliding door, a cab-light switch and a cab-heater switch are provided. The cab-heater switch is mounted so as to cut off the heat when the cab door is swung into the closed position.

DOOR CONTROL IS ELECTRO-PNEUMATIC

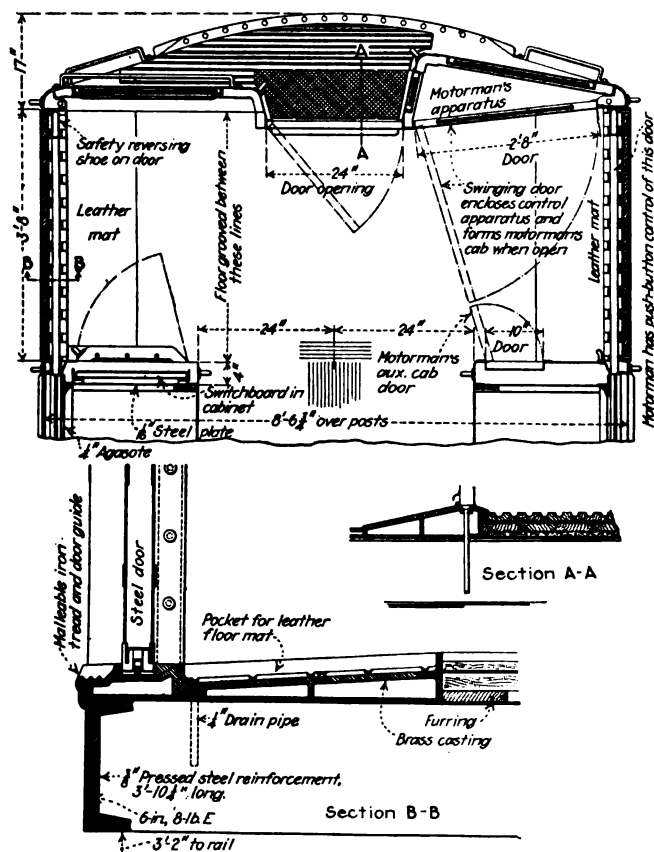
The four sliding doors on each car are controlled by National Pneumatic equipment. Push-button switches are located on the exterior of the dash. Two switches are located on each side of the dash corresponding to the doors on that side at each end of the car. A selector switch allows the control circuit to be arranged so that a guard between two cars may control the adjacent



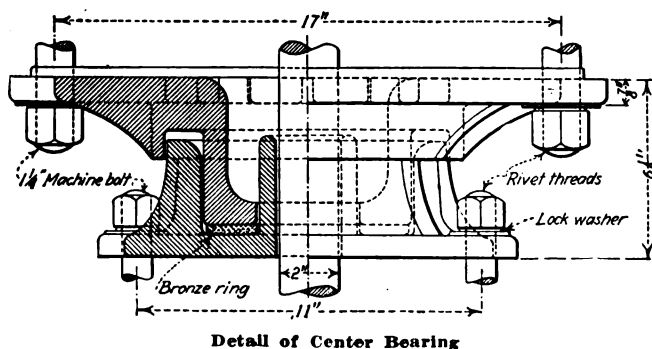
This Section Through the Windows Shows the Side Post and Roof Construction



Design of the Drawbar and Coupler



Platform Construction Showing Arrangement for Motorman's Cab



Detail of Center Bearing

doors in each car or may take control of all four doors on each car. This arrangement allows the train to be operated with one guard for each two cars.

The selector switch has three positions. In the first the control of all four doors on a car is centralized at one end. In the second the control of all four doors

is at the opposite end, and in the third position the two doors at each end of the car can be controlled only from the switches at that end. Thus a guard stationed between two cars can control eight doors or only four doors, two at the adjacent end of each of the cars between which he is stationed. A signal light circuit is arranged to indicate when all four doors in a car have been closed.

The door-control switch in the motorman's cab enables him to open the sliding door at his corner for observation along the outside of the train, without interfering with the control of the remaining doors in the car. An angle cock interlock on the air pipe leading to the motorman's brake valve short circuits the door contacts in the signal circuit when the cock is open, so that the rest of the door signal system on the car is not interfered with when the motorman opens his door.

The door signals on each car are independent and are not interconnected through the train. The starting signal is communicated to the motorman by bell cord, the door signal light system serving only to advise the guard when all the doors on each car have been closed. An automatic reversing switch is installed on the front edge of the door so as to reverse it in the event of a passenger being struck by the door in closing. A door-control cylinder is connected with the air line angle cock on the coupler. When the cocks are closed, as at either end of a train, this cylinder breaks the door-control circuit and makes the doors at that end of the car inoperative.

The cylinders which actuate the door-engine valves and the magnet valves which control the admission of air to these doors are spring operated in the closing position, so that failure of either the power or air supply leaves the doors closed. Each door can then be opened by a manually operated handle located on the engine under the longitudinal seat. Both the actuating cylinders and the controlling magnets are of the same type as those used in the multiple-unit control apparatus, avoiding the necessity of carrying special replacement parts.

BRAKES, TRUCKS AND ELECTRICAL EQUIPMENT

Each car has one motor truck and one trailer truck of Baldwin manufacture. The driving wheels have a diameter of 34 in. and the trailing wheels 31 in.

The brake equipment is Westinghouse universal type with a D-3-F compressor.

Two 165-hp. inside-hung motors, mounted on one truck, are geared for a maximum speed of 40 m.p.h. Westinghouse No. 567 motors are used on seventy-five cars and General Electric No. 243 motors are on the others. The use of two motors mounted on one truck is in accordance with the practice on this property. It is held to reduce the liability of derailment and to make a saving in the weight of trucks. All control and brake apparatus under the car is located so as to keep the car balanced. This allows the control apparatus and conduit to be grouped near the motor truck end of the body and the brake apparatus near the opposite

end, which simplifies the control wiring and air piping.

The control is Westinghouse Type ABLFM on ninety-five cars and General Electric Type PC on ten cars. Duplicate jumper terminals are installed together with a change-over switch, so arranged that the new cars can be operated in trains with either the Westinghouse control equipment on the cars of the Metropolitan division or the General Electric equipment on the Northwestern and Oak Park divisions. The 32-volt storage battery is charged automatically from the power line through a fixed resistance, under the control of a watt-hour meter.

All wiring is installed in conduit. Auxiliary circuit

	Lb.
Weight of body complete with control and brake apparatus.....	45,650
Weight of motor truck.....	11,650
Weight of trail truck.....	9,600
Weight of two 165-hp. motors.....	9,750
Total weight	76,650

switches and fuses are grouped on a specially designed panelboard located in a fireproof switch cabinet in one vestibule. The wiring for door-control circuits is run in individual $\frac{1}{4}$ -in. conduits, one wire per conduit, to eliminate as far as possible the danger of short circuits.

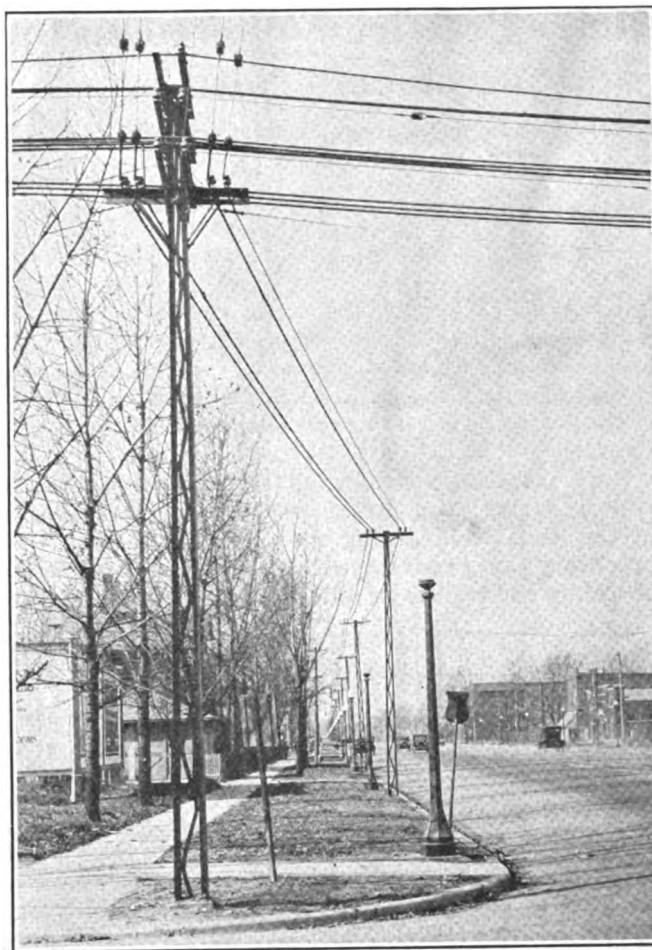
A brief description of this car was given in the *ELECTRIC RAILWAY JOURNAL* for Dec. 8, 1923 on page 993, including a view of the interior and a table of the principal dimensions. Weights of the car are given in the accompanying table.

Steel Poles Improve Street Appearance

THE Chicago & West Towns Railway has recently completed the work of rebuilding a section of its overhead line on West Madison Street, through the village of Oak Park, Ill. The reconstruction was necessitated by a widening of the roadway from 46 to 76 ft. The condition of the old poles was such that it was considered unwise to move them and hence it was decided to replace the entire line.

The new poles are of the Bates expanded steel type, set in concrete to a depth of $5\frac{1}{2}$ ft. They were placed in position ready for the overhead construction before the old poles were removed. Fifteen men, split into four gangs, handled all of the work. Five men dug the holes, followed by two men who placed the forms, after which five men placed the poles in position and three men with a concrete mixer poured the concrete. A form 12 in. x 18 in. x $5\frac{1}{2}$ ft. long was used and the base was cast in a position somewhat off the center of the pole, the bulk of the concrete being on the street side. After a set of ten days the line was in condition to receive the overhead wires. On the north side of the street a 30-ft. pole with a 5-in. top was installed, while on the opposite side a 6-in. top was used because it was necessary to mount a crossarm carrying four feeder cables. One of the accompanying photographs shows a 35-ft. pole with a 7-in. top carrying the line at a feeder intersection.

This entire installation was handled by the men of the West Towns Railway. A tractor trail truck was used to transport the poles from the railroad side track to the job. They were then mounted in position by means of pike poles and a small improvised derrick. No other special construction equipment was required and the poles were lined up by sight, without the use of an instrument. This was done by setting the first two



Chicago & West Towns New Overhead Construction. A 7-In., 35-Ft., One-Piece Pole Is Used as a Corner Pole at Feeder Intersection

poles with a rake away from the street an amount equal to the taper of the pole, thus bringing the far side of the pole into a vertical position as indicated by a plumb line. The third pole was then aligned by sighting along the first two. This process was continued until the complete line was set. The accompanying photograph shows the result obtained.

Favorable comment on the installation has been received by the company from citizens and the village officials. An object of widening the street was to make it a very attractive thoroughfare. With the street light poles placed every 100 ft. along each side of the street and the railway poles every 110 ft., the appearance of the completed job has met with general approval.

Electric Railway Income Tax Statistics

THE following figures for electric railway companies appear in the report of the Commissioner for Internal Revenue on the income tax for 1921, just issued by the Treasury Department:

INCOME TAX DATA OF ELECTRIC RAILWAYS FOR 1921	
Total number of corporations reporting.....	458
Corporations reporting net income:	
Total number	211
Amount of net income.....	\$33,843,158
Income tax.....	8,276,532
War profits and excess profits tax	570,914
Total tax	\$3,847,446
Corporations reporting no net income:	
Total number	241
Deficit reported	\$202,585,944

Meter Practice Followed on the Sacramento Northern

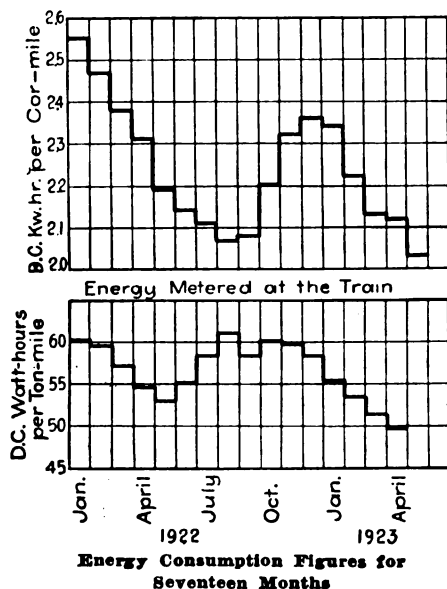
Nearly 9 per Cent Energy Saving per Car-Mile Over 1922 and Still Greater Over 1921— Vacations as Prizes

BY W. H. EVANS

Electrical Engineer Sacramento Northern Railroad,
Sacramento, Cal.

IN NOVEMBER, 1921, the Sacramento Northern Railroad completed the installation of Economy watt-hour meters on nineteen of its interurban cars, and beginning with January, 1922, accurate records were kept each day of the energy consumption of the various motormen and the various trains.

Each month the average unit performance of each train is arrived at and compared with the performance of the same train during the preceding months. As practically every train has either a different combination of motors and trailers or different schedule conditions to



meet, it is felt necessary to compare the record of each train with itself. At the end of each month the record of each motorman for each run on which he operates is compared with the unit consumption of that particular train for the corresponding month of the previous year, and the percentage saving made during each half year is credited

to his power-saving record for that six months. For each six months interval, the motorman with the highest percentage saving of two-car trains or more receives seven days vacation with pay and the second highest, five days vacation with pay. For single-car trains the highest ranking motorman receives five days vacation with pay.

Meter cards are made out by the motormen and handed in each day at the end of their runs with the information filled out concerning their run. A typical meter card is reproduced. In addition, the terminal inspectors read the meters of each motor car when the train is turned over to the motorman and when it is received back from the motorman at the various terminals. This, in addition to providing a check on the motorman's readings, allows us to obtain the energy consumption of the trains stored and handled in the terminal yards.

The meters are connected so as to measure the entire input to each motor car, including not only energy for traction purposes but also for air compressors, heaters and lights. By so doing we are able to obtain an accurate record of all energy used in interurban passenger service and have found this information valuable for statistical purposes in the segregation of certain expenses between passenger and freight service and in

working up data as to cost of operation of various trains and various combinations of equipment.

The meters are equipped with inspection dials, but we have not yet depended upon the use of these dials to any great extent in handling inspection, as mileage records of the various classes of equipment have to be kept for other purposes. They are available therefore as a means of determining when equipment is due for oiling, inspection, etc.

The records for some fifteen to twenty interurban motormen are tabulated daily and summarized at the end of each month in order to arrive at unit consumption figures for each run for each motorman. This work requires about twenty-five to thirty hours per month. The cost of inspection and maintenance of the meters to date has been very small.

The accompanying tabulation showing direct-current kilowatt-hours per car-mile and direct-current watt-hours per ton-mile for the first five months of 1923, as compared to the same five months in 1922, indicates a saving in these five months of about 8.9 per cent. This percentage saving, when applied to the energy consumed per annum for interurban passenger service, will represent a saving in 1923 over 1922 of approximately \$4,600.

[illegible]

Typical Motor Card

As the entire meter installation cost approximately \$2,000, this yearly saving amounts to approximately 230 per cent return on the investment.

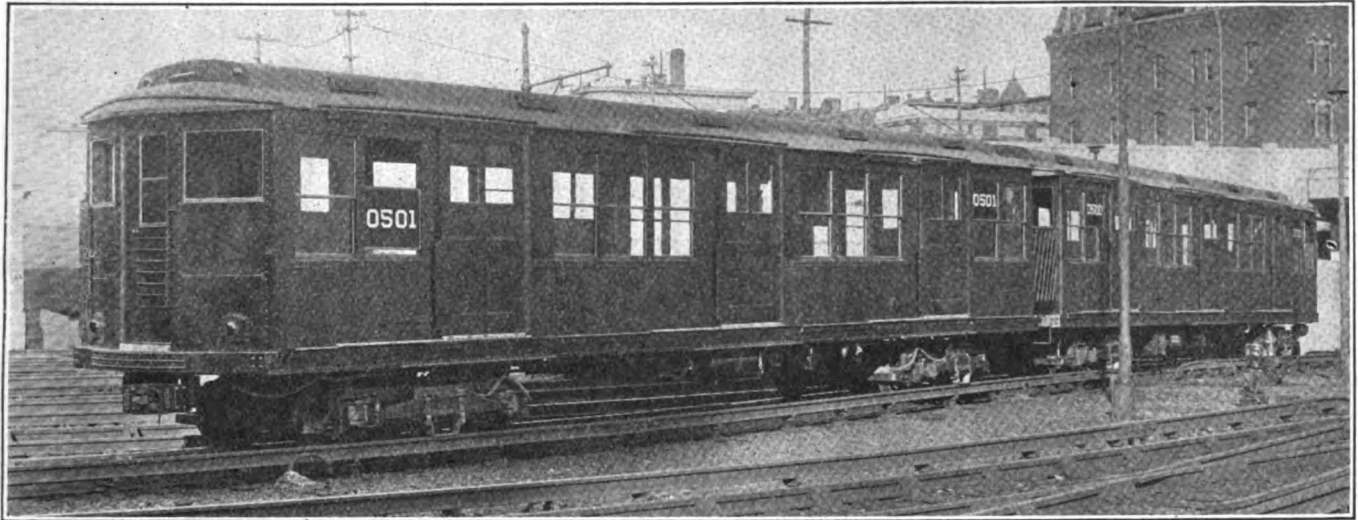
It will be noted from the tabulation and the graphic chart that the average unit consumption decreases from a maximum in January to a minimum during the summer months, rising again during the fall and winter months of the year. This is due to the increased train friction during the colder weather, as well as the additional use of energy for car heating and lighting.

ENERGY CONSUMPTION IN INTERURBAN PASSENGER SERVICE OF SACRAMENTO NORTHERN					
	Direct-Current Kilowatt-Hours per Car-Mile		Direct-Current Watt-Hours per Ton-Mile		Per Cent Saving per Car-Mile, 1923 Over 1922
	1922	1923	1922	1923	
January.....	2.55	2.34	60.2	55.3	8.2
February.....	2.47	2.22	58.5	52.7	10.1
March.....	2.38	2.13	56.4	50.4	10.5
April.....	2.31	2.12	54.5	49.7	8.3
May.....	2.19	2.03	51.6	....	7.3
June.....	2.14	....	50.2	....	....
July.....	2.11	....	49.8	....	....
August.....	2.07	....	51.5	....	....
September.....	2.08	....	48.9	....	....
October.....	2.20	....	57.6	....	....
November.....	2.32	....	54.8	....	....
December.....	2.36	....	57.0	....	....

Energy metered at the train.

The train make-up averages 62.3 per cent of motor cars and 37.7 per cent of trailers.

It will be noted that the average consumption for 1923 is running about 8.9 per cent less than for the same months in 1922. There is no doubt also but that the average unit consumption during 1922 was less than during 1921, when meters were not installed. Therefore the total saving which our men have made has undoubtedly been greater than the 8.9 per cent obtained in 1923 over the 1922 figures.



Two of the New Steel Cars to Be Used in the East Boston Tunnel

Relief Effected by Train Operation in East Boston Tunnel

By the Addition of a Terminal Station at Maverick Square in East Boston and New Rolling Stock—Rapid Transit Service Will Be Substituted for Surface Car Type of Service—Rush Hour Capacity of the Tunnel Will Be Increased 136 per Cent

By Edward Dana

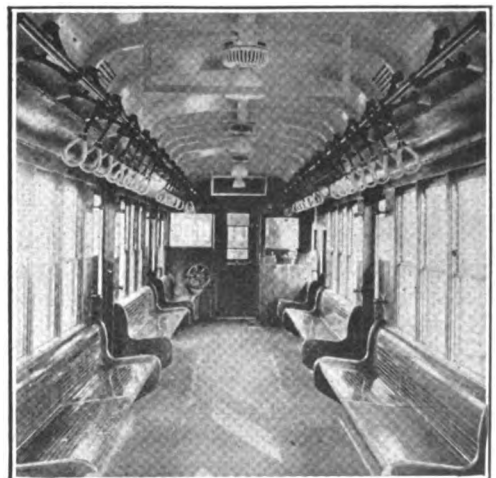
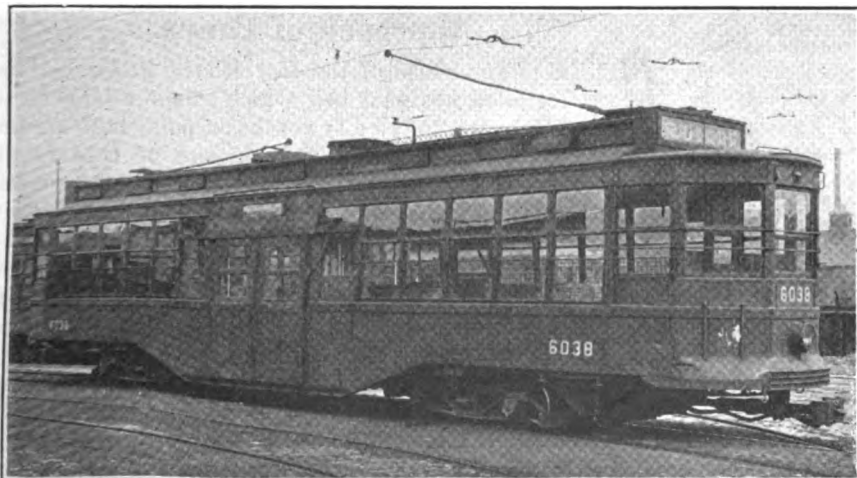
General Manager Boston Elevated Railway

THE East Boston Tunnel was originally constructed by the Boston Transit Commission under Sec. 17, Chap. 500, Acts of 1897. Work was begun on May 5, 1900, and the tunnel was open for public travel on Dec. 30, 1904. The total cost of this section of the tunnel was \$3,370,000 and the approximate length 1.42 miles. The tunnel runs 82.3 ft. below low water at the bottom of the masonry. The maximum grade is 5 per cent for a total length of 880 ft.

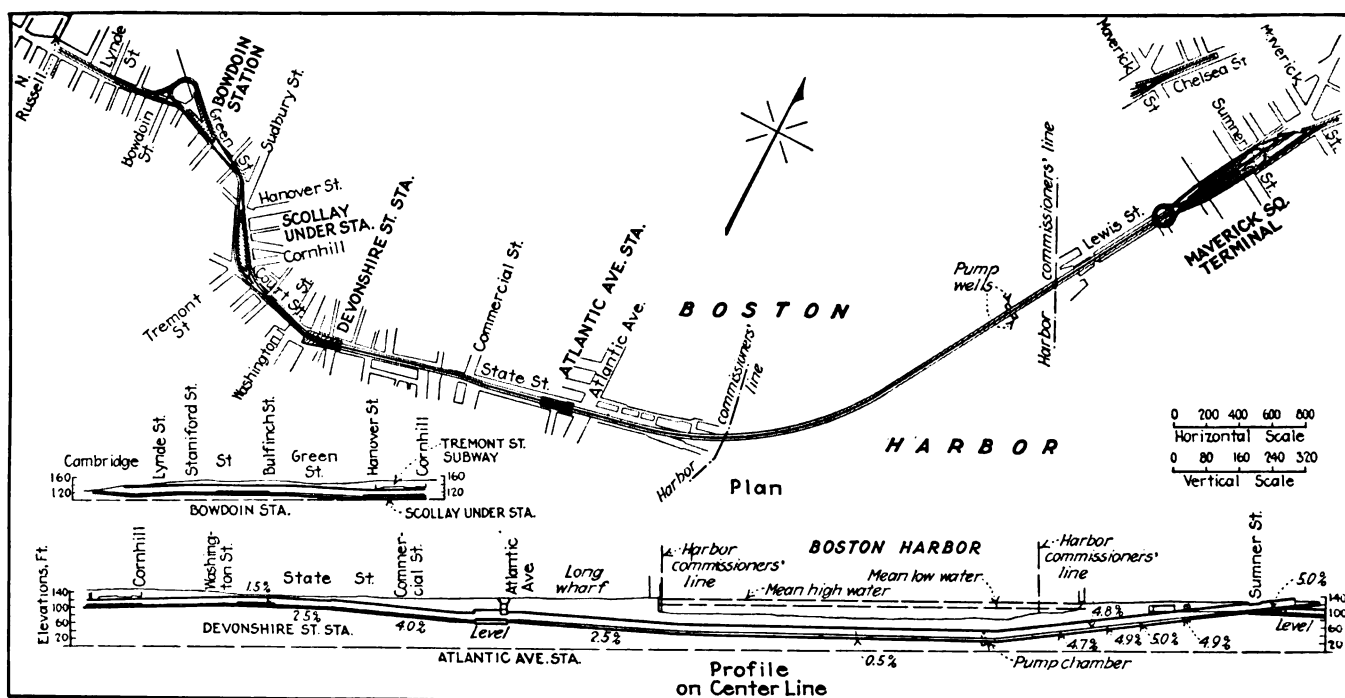
An extension of 0.41 mile to Bowdoin Square was authorized by Acts of 1911, Chap. 741, and work on this section was commenced on Nov. 9, 1912. It was completed and operation started on March 18, 1916.

This extension cost \$2,287,000 and afforded relief and ushered in a period of greater use. The shifting of the trolleys on the cars at Devonshire Street Station, the original terminus, had reached an unbearable point. This extension also permitted the bodily transfer of passengers at Scollay Understation to cars operated in the Tremont Street Subway.

Up to the present time tunnel service has been supplied by surface cars which have entered and left the tunnel at the East Boston end. On March 1, 1924, there will be completed the Maverick Square Terminal in East Boston, which will then separate the tunnel operation from the surface tracks in East Boston and



At Left, Center-Entrance Car Now Used in East Boston Tunnel. At Right, Interior of New Steel Cars



Plan and Profile of East Boston Tunnel, Showing Position of Maverick Square Station at East Boston End of Tunnel

permit only steel trains to be operated in the tunnel. This terminal and its connections will cost \$2,500,000, which makes a total of \$8,157,000 for the approximate construction cost. In addition, \$904,879 will have been expended for equipment in the tunnel since it was constructed in 1904, making a grand total of \$9,061,879.

The steel cars which are now being equipped in the company's shop are unique in many ways and were described in the *ELECTRIC RAILWAY JOURNAL* of Jan. 13, 1923.

The summary of statistics of these new cars as compared with the present center-entrance cars is as follows:

	East Boston Tunnel Cars	Center Entrance Motor Cars
Length over all.....	47 ft. 3 in.	48 ft. 9 in.
Height from top of rail to top of roof.....	11 ft. 3 in.	11 ft. 7 in.
Width outside sills.....	8 ft. 3 in.	8 ft. 5 in.
Width over all.....	8 ft. 7 in.	8 ft. 8 in.
Width of side doors.....	3 ft. 9 in.	6 ft. 6 in.
Diameter of wheels.....	26 in.	24 in.
Seated passengers.....	44	56
Standing passengers.....	136	95
Sashes.....	Brass	Wood and brass
Roof.....	Monitor arch	Monitor
Ventilators.....	Perry	Perry
Flooring.....	"Truss Plate" with Mastic Coating	Wood
Door engines.....	Consolidated Car Heating Company (elec.)	Consolidated Car Heating Company (pneu.)
Electric pneumatic brake.....	West, var. load (automatic)	West, S.M.E.
Motors.....	4 West-514-E	4 GE-247
Controller.....	GE P.C.-5	GE P.C.-5
Car straps.....	Rico	Leather
Manufacturers of car bodies.....	Pullman Company	Brill
Weight.....	44,400 lb.	45,000 lb.

It is expected that by March 1, 1924, steel trains will be in operation in the East Boston Tunnel between Maverick Square on the East Boston end and Bowdoin Square on the Boston end. The relief to passenger traffic effected by this change in method of operation can hardly be appreciated when one considers that except for the terminal station at Maverick Square the tunnel is, to all intents and purposes, the same tunnel.

The average daily weekday passenger load has constantly increased as shown in the following table:

1905.....	33,118	1915.....	51,712
1906.....	37,434	1916.....	63,506
1907.....	40,864	1917.....	72,970
1908.....	41,086	1918.....	69,124
1909.....	42,072	1919.....	78,585
1910.....	44,719	1920.....	75,669
1911.....	46,353	1921.....	73,765
1912.....	50,445	1922.....	77,053
1913.....	54,526	1923.....	78,970
1914.....	54,678		

The capacity of the tunnel at the present time has been reached for surface car operation. It is only possible to operate 121 surface cars through the tunnel during the rush hours, though many of these cars were connected up as three-car trains. The ultimate capacity (with six-car trains) under the arrangement made for operating steel trains will provide for 240 cars per maximum hour. As the maximum carrying capacity of the surface car is 151 and the new steel car 180, this increases the capacity of the tunnel 136 per cent in the rush hours. In the light of past growth in traffic, it is reasonable to suppose that this tunnel will be able to take care of the traffic for at least ten years to come.

Bell in Power House Announces Approach of Cars

IN THE power house of the Harrisburg Railways has been installed a signal bell which rings whenever a street car inbound to the city reaches a point half a mile beyond the power house. The purpose of this is to enable the power house men desiring to go home to wait under cover until the car is close by. They then have just comfortable time to reach the nearest trolley station. Formerly the men used to go out and wait on the street corner, but after many hours work in the heat of the boiler room the waiting in the cold wind out doors was very injurious to the health of the employees. Last summer during track construction work signal wires were strung on the company poles along the street. Upon the completion of the track job the line foreman allowed some of these wires to remain and the signal bell was connected with a contactor by this means.

Building Good Employee Relations in Kansas City*

The Principles and Organization Plan of the Employee Brotherhood and Representation Plan Which Have Contributed to the Present Favorable Situation in Kansas City—Separate Committee Handles All Wage Matters—Membership in Brotherhood Is Entirely Voluntary

MORE and more is being heard of the fine relations existing between the management and employees of the Kansas City Railways. In view of the success that has been attained, it is interesting to present the company's view of the plan and its working. The company believes that its provisions for employee participation in the control of all matters relating to his welfare are novel, sound and successful and largely without parallel in the electric railway industry. Experience with the plan of co-operation in effect has demonstrated, it is felt, that these arrangements con-

tion in the control of wages and working conditions is entirely separate and distinct from all other organizations on the property. The brotherhood, to which 97 per cent of the men belong and which handles all benefits, is distinct from the committees for adjusting wages and working conditions. The company feels that it has no more right to enforce a closed shop for its own brotherhood than it would have for a union. The plan for collective bargaining also permits the employees to act independently. There is no company dictation. The men have the right to act and deliberate as men and, to

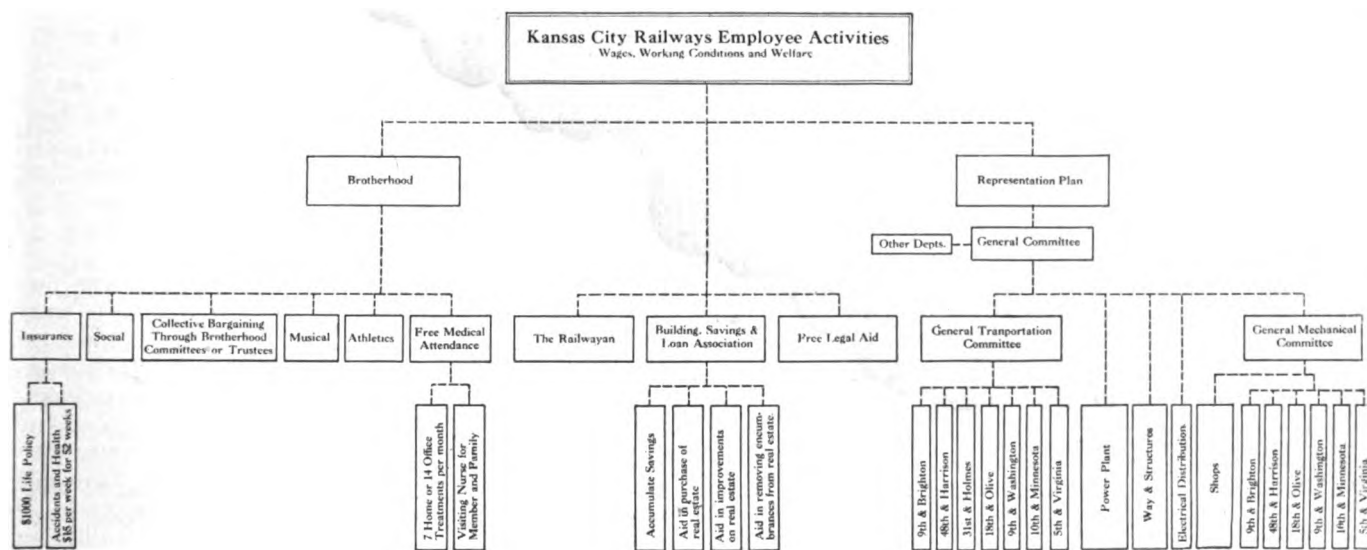


Chart Showing Kansas City Railways Employee Activities

tribute in a vital way to every phase of the transportation service rendered. In fact, the cordial co-operation between the management and employees has been considered the very mainspring of the achievements and progress noted in respect to other phases of the railway operation.

In building up the various organizations and activities which have a bearing on employee relationship, the following ideas have been kept in mind as the cardinal principles, some of them differing fundamentally from the old accepted ideas:

1. There is no welfare work in the ordinary sense of the term on the Kansas City Railways. Men have the right to accept benefits of one kind and another, if they so desire, and not otherwise. The men pay for a large proportion of such benefits, and while the company assists financially, this assistance is never mentioned.

2. Membership in company organizations is purely voluntary.

3. The machinery for providing employee participa-

carry out this thought, meetings are regularly held in every carhouse and in every department.

4. It is maintained that there should be no secrets. Every man on the property should know what is going on, what the company is doing, what the financial reports show. These things are explained so that they may be understood. Any man, trainman or otherwise, works better when he works intelligently and when he knows the results of his work are an integral part of the organization. At the regular meetings these matters are all explained by company officials.

The above four statements represent the platform upon which the company's employee relations have been constructed. The two outstanding features are the representation plan and the brotherhood.

THE EMPLOYEES' REPRESENTATION PLAN

The representation plan of the Kansas City Railways employees provides for co-operation in the operation of the railway system. Its objects are as follows:

1. To insure to every employee exact justice in all matters of discipline or discharge.

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

REFER TO OUR NO.

SACRAMENTO NORTHERN RAILROAD

OFFICE OF
Electrical Engineer.

Mr. A. V. Thompson,
Assistant Local Sales Manager,
General Electric Company,
Rialto Building,
San Francisco, California.

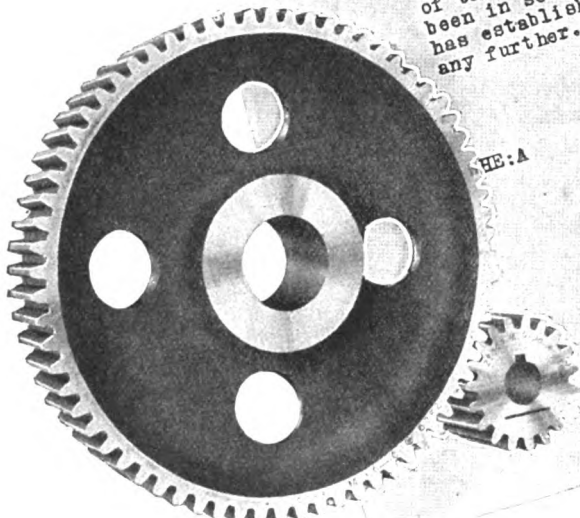
Dear Sir:

I enclose for your information carbon print of GE pinion 115134 installed on a GE-222-G motor (40P) operating on our car 201.

This pinion went into service, together with the equipment, in July, 1915, and has made in the neighborhood of 400,000 miles, being the first grade "M" material which we used on our system.

Apparently, from the small amount of wear shown on this pinion and the other gears and pinions on this car, it is hardly worth while in going to any great amount of trouble to keep mileage records, as material which has been in service for seven years and is still operative has established a record which hardly requires checking up any further.

Yours very truly,
W. H. Evans




IT is the mileage records back of testimony like this which have made Grade M Gears the more-miles-per-dollar gearing.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

40-299

GENERAL ELECTRIC

New York, January 12, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, Editors

Volume 63
Number 2

Baiting the Vote Hook in Illinois

EQUITABLE decisions, serving the best interests of both the public and the investor in utility securities, are insured when the personnel of state regulatory commissions is appointed on the basis of training, experience and general fitness for such positions. When these commissions are allowed to function without political interference, fair and constructive action has nearly always resulted. But the game played by spoils politicians exerts a degenerating influence on the commission form of regulation. Not only does it require appointments to be carefully distributed in accordance with vote-producing power, regardless of any other qualifications, but the politician-commissioner is usually so securely bound to the patronage-fed political machine, that these ties effectually strangle any impulse toward fair and constructive rulings.

The Illinois commission has done and is doing a great deal of constructive work. In recent years, however, its members have been handled very much as chess men, to be maneuvered about in accordance with the exigencies of the political game. The latest move has been the appointment of a negro as a member of the Illinois Commerce Commission. As a political maneuver to help Governor Small control the negro vote of the state it was probably far-sighted, but it is very doubtful if the best interests of the people of Illinois were the main consideration when weighing the qualifications, experience and influence of the new appointee.

New York Transit Lines May Extend in New Jersey

THE suggestion of the New York Transit Commission that the Interborough Rapid Transit System be extended by two lines from downtown Manhattan to New Jersey is in line with correct principles in city transportation. To secure economy in operation through a balanced load, trains should be routed through the business section of a community. Heretofore, state boundaries have been considered a barrier to the extension to New Jersey of a transit system built by money advanced by the city of New York. The result has been that these lines have been constructed within the city limits north, east and southeast from Manhattan Island, but with no outlet to the west. There has been some opportunity to balance traffic through the lines to Brooklyn, Queens and the Bronx, but no use has been made for this purpose of the vast army of commuters who do business in lower Manhattan but live west of the Hudson River.

To some it may seem anomalous that a purely municipal enterprise should extend its activities beyond

the limits of the city and indeed of the state, but the principles of engineering are not changed by political boundaries. The municipal tramway systems of Great Britain found that they had to extend beyond the city boundaries to obtain best results, and there is no reason why the city of New York should not follow their example. The Port Authority, the interstate vehicular tunnel and the interstate park furnish precedents. The method of political control for such transit extensions may present greater complications than in the case of any of the earlier interstate undertakings mentioned, but this obstacle should not prove insurmountable. The citizens of New York City and of its New Jersey suburbs should not allow the possible conflicting interests of state politicians to stand in the way of such a real transportation improvement.

A Half a Loaf Is Better than No Bread

ONE of the most serious questions in the electric railway industry today relates to the preservation of the small city property. In a large city a great proportion of the riding is compulsory. The streets are too congested for much private automobile service, and the distances are too long to make walking a serious competitor of car riding. Hence, unless politics prevents the charge of an adequate fare, the road can usually be made to pay. Traffic may fall off slightly with an increase in fare, but even the largest increase in street railway fare which has been made in this country is small compared with either the service given or the increase in price of most of the commodities which the public has to buy. In consequence, at any fare up to 10 cents, or perhaps more, there is no danger that there will be a permanent falling off of any considerable amount of patronage on the large city railway.

But with the road in a small city, say with a population of from 25,000 to 100,000, conditions are almost reversed. In such a city automobile driving into the center of the community is not only possible, but there is often ample parking space. Moreover, the private auto usually provides not only quicker service than the trolley, but exclusive service, which most automobile owners think more of than they do of the higher cost of riding to business in their own cars. Finally, the distances in the small city between most points are so short that walking is possible for a great many trips, and if the car headway is at all infrequent walking is often the quicker way of getting from one point to another.

What should a railway do in these circumstances? Well, it can do a number of things. If there is jitney

competition it can secure its reduction. It can reroute its cars if a study of the situation shows that to be desirable, and it can usually increase their schedule speed. It can employ one-man operation if that has not been done. It can discourage the use of private automobile by argument, so far as that is possible, and it can cultivate good public relations in a variety of ways. Finally, if these do not suffice, it can increase its fare.

But suppose that the railway company has done all these things and has reduced its operating expenses and increased its headways and its fare to the danger point, but still the income from operation is inadequate to pay a reasonable return on the investment. What can it do then, to be saved? This is not a purely hypothetical condition. It is a very real problem on a number of properties.

It is easier to answer the question what not to do in circumstances of this kind than to tell exactly what to do. The main thing not to do is not to get discouraged. Conditions like this cannot last always. It may be that in existing circumstances the investment in the property was unwise, but these conditions may change. The private automobiles in the city may become so numerous as to compel the passage of laws curbing their use or the extent of their parking in the downtown streets. There may be such a reduction in general wages as again to bring the operating ratio of the railway company to a reasonable figure. The city may grow so much as to make car riding necessary to many who now walk. In the meantime, if a reasonable return is not earned, the security holders should prefer a low return to none at all. If the road is abandoned, they certainly will at the best get very little of their money back.

Many manufacturers in dull times keep their factories going to avoid a greater loss. A railway in the condition described should realize the truth of the old adage that half a loaf is better than no bread.

Right Follow-Up Will Reduce Accidents of New Men

REVIEWING the accident statistics of a large street railway property recently it was clearly evident that new men are most likely to be involved in serious accidents after they have been in service for periods ranging from two months to one year. Experience of this company has also demonstrated that a new man who has one or two minor accidents during his early experience is less likely to have a really serious accident due to carelessness, than is the man who has been entirely free from accidents for several months, after first going into service.

Psychologically, the condition is probably explained thus. After the initial period of training has been completed the new man is keenly alert because of the newness of the work. As he becomes more accustomed to the job this work becomes more and more automatic. If he is fortunate enough to escape minor accidents during the first two or three months, his increasing self-confidence is very likely to be accompanied by a tendency toward carelessness. When this occurs the scene has been set, it seems, for a serious accident. On the other hand a minor accident or two early in the new man's experience brings him to a more permanent realization of the hazards.

A properly designed course of follow-up, or supple-

mental instruction for new employees, should therefore take the man back periodically over the fundamentals of correct and safe operation so as to overcome this increasing tendency toward carelessness, as far as possible, before his bad accident occurs. To this end a very important part of the safety man's work on a railway property is the study of the causes of accidents in which new men are involved, with a view toward developing charts and talks to form the basis of an instruction course that will carry the new man along progressively until he can be rated as an experienced operator. Even then, of course, experience has shown that continued effort in keeping the subject of safety in the limelight gives handsome returns in the form of reduced accidents.

Training Platform Men for Present-Day Conditions

CAR operation under present-day street traffic conditions is a very different problem from that of only a few years ago, and its bearing on the subject of trainmen's instruction is worthy of careful consideration. In many cases the course of instruction now being given to new men was prepared when traffic conditions were very different from what they are today. As a result, the period of training may be too short to prepare new operators safely to cope with modern street conditions, or some practices taught may be altogether out of date. A rule book containing many obsolete paragraphs or clauses, or failing to cover important new items, tends to lower the entire book in the respect of the trainman.

There also have been many developments and changes in car equipment. Among these is the requirement that both motormen and conductors must handle equipment. Developments in door operating apparatus and brake and control equipment are other examples. The increasing use of train operation in the form of motor car and trailer, or motor units equipped with multiple-unit control, have brought new operating problems that should be adequately covered in the course of instruction for new men as well as in instructions issued to old crews.

Material physical damage to new equipment sometimes has resulted from putting it into service in charge of men who, though old in the service, perhaps, were not properly instructed relative to its operation. Aside from the resulting repair bills, such practice causes serious operating delays and consequently the new equipment makes a bad initial impression on the public where a good impression was most important. In such cases the trainmen got the blame but it really belongs on the shoulders of the company officials who did not give the matter sufficient attention.

In addition to the need for more thorough and more appropriate training which is brought about by modern traffic conditions and new equipment, the close contact between the platform man and the traveling public makes his training an exceedingly important factor in the all-important question of establishing and maintaining favorable public relations. Thus liberal expenditures of time and money in the more thorough instruction of new employees would seem to be well justified. The opportunities available for improvement commend the subject to the attention of progressive managements.

Passenger Comfort the Feature of the New Chicago "L" Cars

Although Low First Cost and Maintenance Were Considered, the Car Rider's Convenience Has Precedence—Plush Seats, Liberal Ventilation, and Insulation Against Noise and Cold Are Features—Wood Roof Considered Necessary for Overhead Trolley—Steel Headlining and Sub-Floor Reduce Fire Hazard

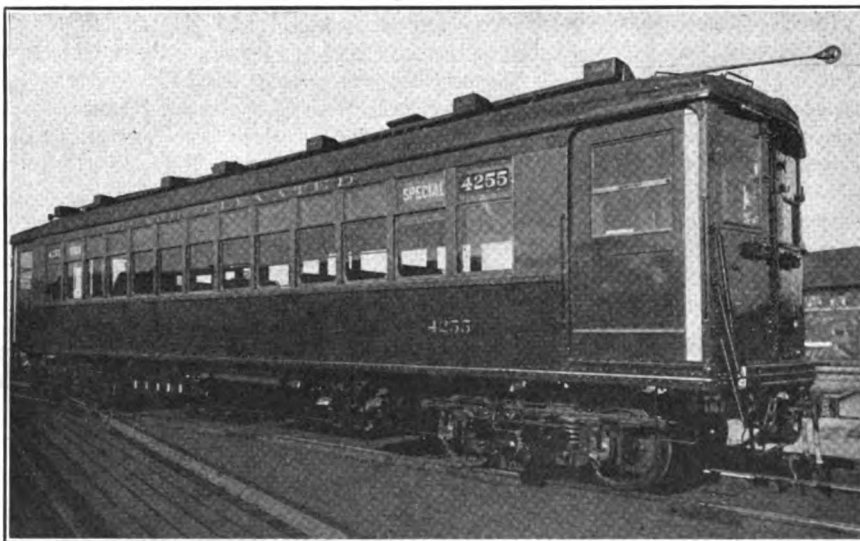
SAFETY and comfort of passengers have been the primary factors considered in the design of the new steel motor cars recently put in service by the Chicago Elevated Railroad. Although careful attention has been given to the design of the car structure and its apparatus, to secure low first cost and low maintenance, the comfort and convenience of passengers was made the controlling consideration. This policy is reflected both in the construction of the car itself and in the selection of its equipment. The psychological factor in winning public approval and good will has been taken into account and the appearance and finish of the cars were given careful thought.

The interior trim is in natural mahogany. Where steel panels or posts are exposed in the interior they are stained and grained to imitate the other finish. The headlining is painted a light cream color and is paneled with mahogany moldings. The steel curtain molding, stained to match, is made up in a simple and pleasing shape. It is formed at the upper edge to hold the advertising cards. This molding is carried across the bulkhead panel so as to carry out a stream-line effect on the interior. The curtains are made of double-faced Pantasote with Railway Supply & Curtain Company rollers and fixtures. Electric Service Supply Company roller signs are installed in the four corner windows of the body.

There are eighteen Hale & Kilburn reversible cross-seats spaced on 32½-in. centers, which corresponds with the spacing of the side posts, so as to give a full window opening at each seat. Longitudinal seats at the four corners of the body provide additional space for sixteen passengers, making a total seating capacity of fifty-two. The seats are of full spring construction and are upholstered in high-grade green figured plush. The slope of the backs was carefully considered from the standpoint of comfort, and with this point also in view the longitudinal seat cushions are tilted so as to make them as comfortable as possible.

The illumination in the body is furnished by twenty shaded 23-watt lamps installed in three rows. Two rows are spaced approximately over the centers of the cross-seats and the third is in the middle of the car. A separate circuit furnishes the illumination for vestibules and cabs. Four battery lamps in the body are controlled by a no-voltage relay, when the power supply is off, to keep the car from being in darkness.

Twenty-four Consolidated electric heaters of 630



Sliding Doors Are Protected by Reversing Shoe on Edge

watts capacity each are controlled by Utility thermostat equipment. In addition a 1,200-watt heater is installed in each motorman's cab. Although the Chicago ordinances require a minimum temperature of 50 deg. F. for the interior of cars, the thermostats have been set to cut the heat in at 58 deg. F. and out at 60 deg. F., with the idea that this temperature would be most comfortable for passengers in long-haul elevated service.

Grab handles are conveniently placed to give security and convenience to standing passengers, and the leather hand straps of the customary type have been replaced by rigid overhead grab handles of the "Rico Steelkar" type, arranged to spring back out of the way when not in use. These handles and their supports are finished in white enamel.

FLOOR INSULATED AGAINST NOISE AND COLD

Composition floors used on previous steel cars proved unsatisfactory on account of their coldness. On these new cars, therefore, a double wood floor was used. This consists of a layer of 1½-in. tongue-and-groove yellow pine beneath, laid crosswise, with 1½-in. x 2½-in. tongue-and-groove maple above, laid longitudinally within the body and crosswise of the car in the vestibules. To insure a comfortable temperature and also to prevent the transmission of noise to the interior of the car, a ½-in. layer of compressed hair insulating material is laid between the steel underframe and the lower wood floor. In addition, two thicknesses of building felt are used between the upper and lower wood floors. Aisle strips are formed by rabbeting the top floor boards both on the interior of the body and in the vestibules. At the door thresholds these rabbeted grooves are tapered up flush with the top

of the floor so as to facilitate cleaning. Safety treads are used at all door openings, and in addition a leather mat is set into a brass casting located at each sliding door, designed to drain off water and keep the car floor as clean as possible.

Liberal provision is made to insure good ventilation. Two Utility automatic air intakes are located at each end of the body, so arranged that the intake grilles are mounted in the body headers. There are two additional intakes at the center of the body. This equipment is designed to draw in air when the car is moving in either direction. Four Utility exhaust ventilators are spaced on the roof along each side of the car between the intakes. Carrying still further the policy of providing the maximum of comfort to passengers, each car is equipped with two oscillating fans mounted on the bulkhead headers and operated from the 32-volt storage battery.

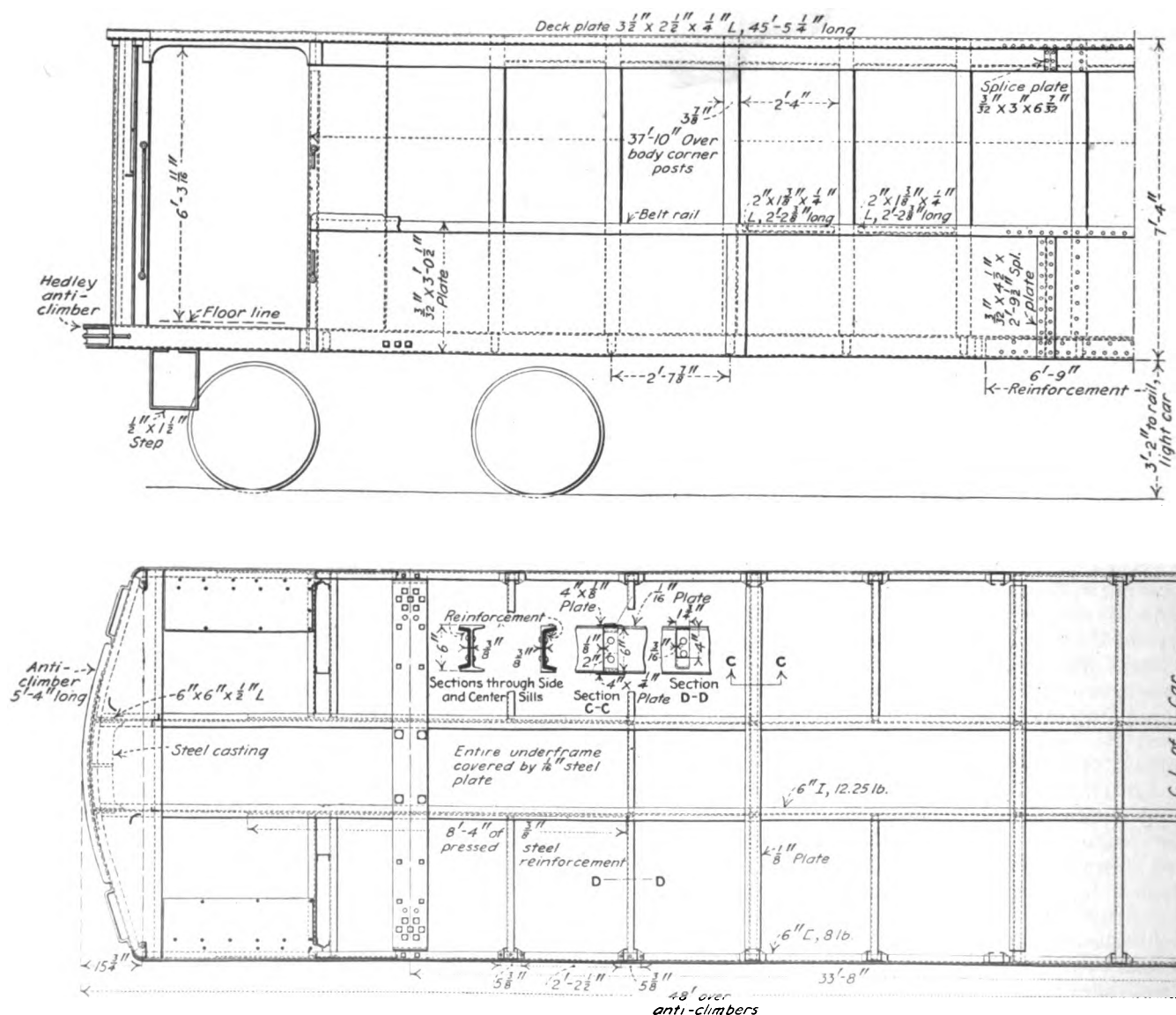
Operation of these cars on the Evanston branch of the Northwestern line and on the Oak Park division requires overhead trolley equipment. The roof therefore has been made of wood to insure proper electrical insulation. The construction, however, has been designed to be as nearly fireproof as possible under these conditions. To this end the headlining is made of $\frac{1}{8}$ -in. steel. For the same reason a sheet of $\frac{1}{8}$ -in. steel covers the entire under-

frame structure below the wood floor, protecting the car against fire and tying the underframe members together in place of using the customary type of diagonal bracing.

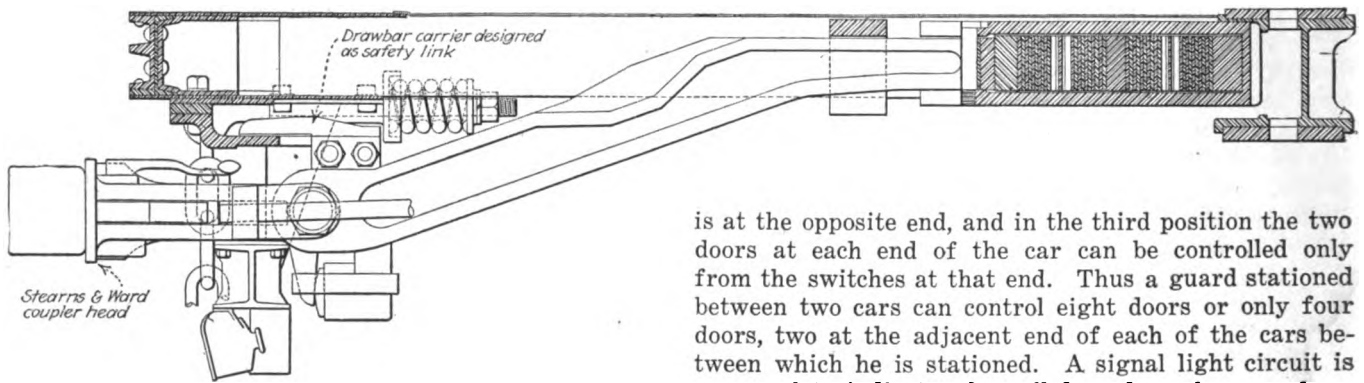
THE CAR FRAMING IS OF RUGGED CONSTRUCTION

The underframe itself is designed to withstand impact incident to coupling of long trains, and is also reinforced longitudinally to prevent excessive damage in case of collision. The built-up body bolsters are made with a $\frac{3}{4}$ -in. x 9-in. mild steel upper plate and a 1-in. x 9-in. bottom plate, separated by a steel casting at the center with an extension which is riveted to the center sills, forming an anchorage for the draft gear. The center sills consist of two 6-in. x 12 $\frac{1}{2}$ -lb. I-beams in one continuous length between bumpers and spaced on 24-in. centers. These are reinforced at the bolsters by 8-ft. 4-in. sections of $\frac{3}{4}$ -in. pressed-steel channel riveted to the I-beam.

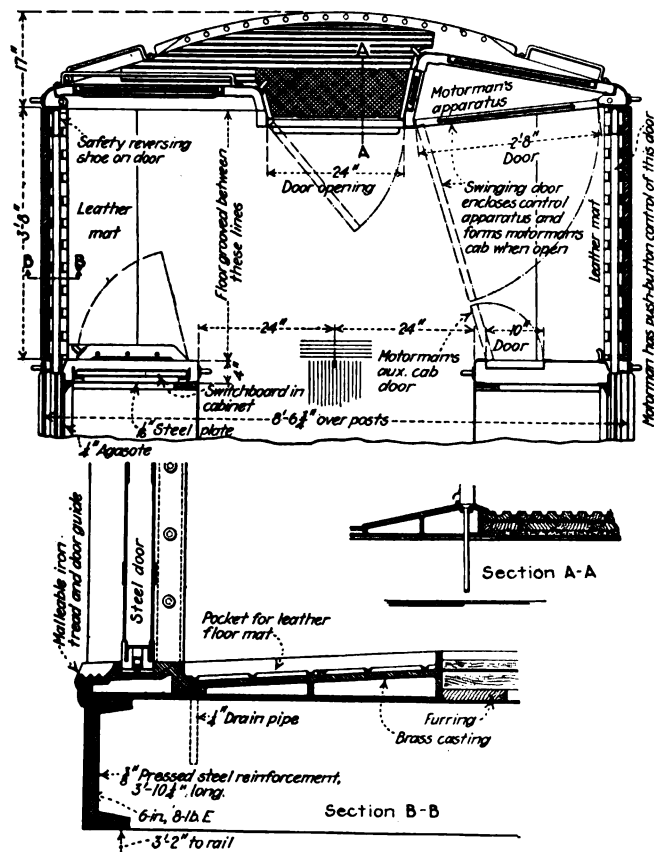
Continuous 6-in. x 8-lb. channel side sills are run from bumper to bumper. These are also reinforced with sections of $\frac{3}{4}$ -in. pressed-steel channel, both between the bumper and bolster and at the center of the car. The bumpers are 6-in. x 8-lb. channel and are reinforced with anti-climbers 5 ft. 4 in. long riveted to the outside. A $\frac{1}{8}$ -in. thick plate, 19 in. wide at the center, is riveted



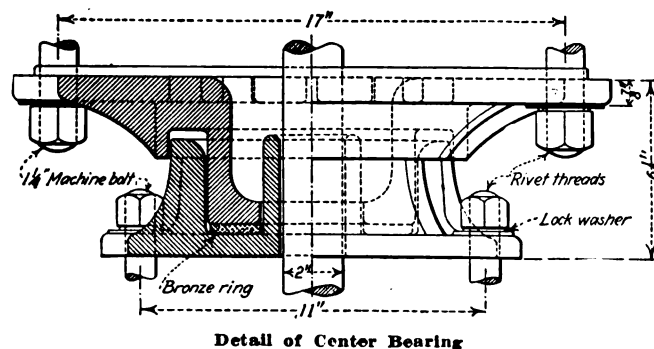
Plan and Elevation of the Framing of the New Chicago "L" Car



Design of the Drawbar and Coupler



Platform Construction Showing Arrangement for Motorman's Cab



Detail of Center Bearing

doors in each car or may take control of all four doors on each car. This arrangement allows the train to be operated with one guard for each two cars.

The selector switch has three positions. In the first the control of all four doors on a car is centralized at one end. In the second the control of all four doors

is at the opposite end, and in the third position the two doors at each end of the car can be controlled only from the switches at that end. Thus a guard stationed between two cars can control eight doors or only four doors, two at the adjacent end of each of the cars between which he is stationed. A signal light circuit is arranged to indicate when all four doors in a car have been closed.

The door-control switch in the motorman's cab enables him to open the sliding door at his corner for observation along the outside of the train, without interfering with the control of the remaining doors in the car. An angle cock interlock on the air pipe leading to the motorman's brake valve short circuits the door contacts in the signal circuit when the cock is open, so that the rest of the door signal system on the car is not interfered with when the motorman opens his door.

The door signals on each car are independent and are not interconnected through the train. The starting signal is communicated to the motorman by bell cord, the door signal light system serving only to advise the guard when all the doors on each car have been closed. An automatic reversing switch is installed on the front edge of the door so as to reverse it in the event of a passenger being struck by the door in closing. A door-control cylinder is connected with the air line angle cock on the coupler. When the cocks are closed, as at either end of a train, this cylinder breaks the door-control circuit and makes the doors at that end of the car inoperative.

The cylinders which actuate the door-engine valves and the magnet valves which control the admission of air to these doors are spring operated in the closing position, so that failure of either the power or air supply leaves the doors closed. Each door can then be opened by a manually operated handle located on the engine under the longitudinal seat. Both the actuating cylinders and the controlling magnets are of the same type as those used in the multiple-unit control apparatus, avoiding the necessity of carrying special replacement parts.

BRAKES, TRUCKS AND ELECTRICAL EQUIPMENT

Each car has one motor truck and one trailer truck of Baldwin manufacture. The driving wheels have a diameter of 34 in. and the trailing wheels 31 in.

The brake equipment is Westinghouse universal type with a D-3-F compressor.

Two 165-hp. inside-hung motors, mounted on one truck, are geared for a maximum speed of 40 m.p.h. Westinghouse No. 567 motors are used on seventy-five cars and General Electric No. 243 motors are on the others. The use of two motors mounted on one truck is in accordance with the practice on this property. It is held to reduce the liability of derailment and to make a saving in the weight of trucks. All control and brake apparatus under the car is located so as to keep the car balanced. This allows the control apparatus and conduit to be grouped near the motor truck end of the body and the brake apparatus near the opposite

end, which simplifies the control wiring and air piping.

The control is Westinghouse Type ABLFM on ninety-five cars and General Electric Type PC on ten cars. Duplicate jumper terminals are installed together with a change-over switch, so arranged that the new cars can be operated in trains with either the Westinghouse control equipment on the cars of the Metropolitan division or the General Electric equipment on the Northwestern and Oak Park divisions. The 32-volt storage battery is charged automatically from the power line through a fixed resistance, under the control of a watt-hour meter.

All wiring is installed in conduit. Auxiliary circuit

	Lb.
Weight of body complete with control and brake apparatus	45,650
Weight of motor truck	11,650
Weight of trail truck	9,600
Weight of two 165-hp. motors	9,700
Total weight	76,650

switches, and fuses are grouped on a specially designed panelboard located in a fireproof switch cabinet in one vestibule. The wiring for door-control circuits is run in individual $\frac{1}{4}$ -in. conduits, one wire per conduit, to eliminate as far as possible the danger of short circuits.

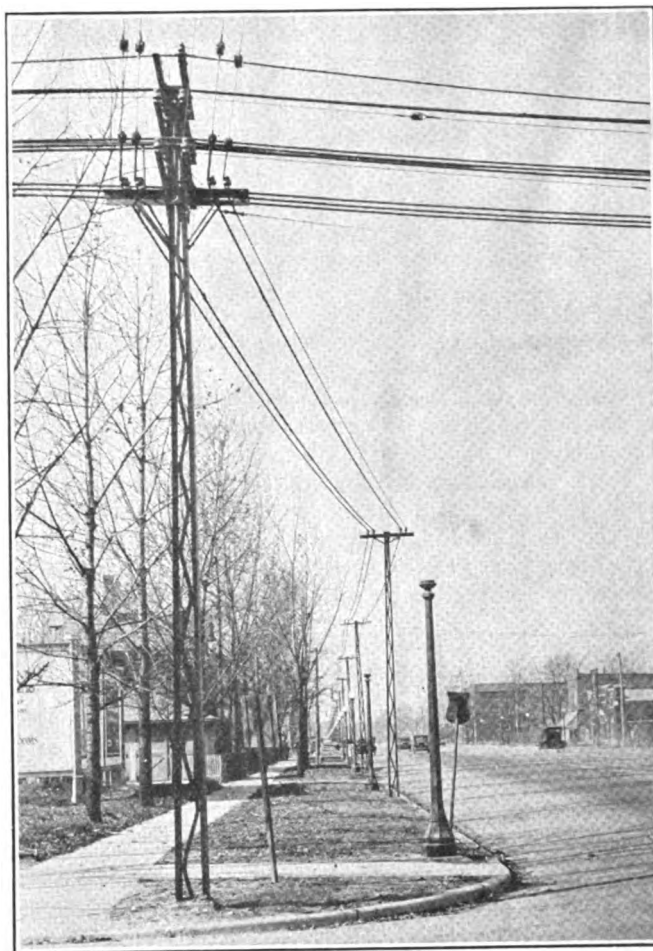
A brief description of this car was given in the *ELECTRIC RAILWAY JOURNAL* for Dec. 8, 1923 on page 993, including a view of the interior and a table of the principal dimensions. Weights of the car are given in the accompanying table.

Steel Poles Improve Street Appearance

THE Chicago & West Towns Railway has recently completed the work of rebuilding a section of its overhead line on West Madison Street, through the village of Oak Park, Ill. The reconstruction was necessitated by a widening of the roadway from 46 to 76 ft. The condition of the old poles was such that it was considered unwise to move them and hence it was decided to replace the entire line.

The new poles are of the Bates expanded steel type, set in concrete to a depth of $5\frac{1}{2}$ ft. They were placed in position ready for the overhead construction before the old poles were removed. Fifteen men, split into four gangs, handled all of the work. Five men dug the holes, followed by two men who placed the forms, after which five men placed the poles in position and three men with a concrete mixer poured the concrete. A form 12 in. x 18 in. x $5\frac{1}{2}$ ft. long was used and the base was cast in a position somewhat off the center of the pole, the bulk of the concrete being on the street side. After a set of ten days the line was in condition to receive the overhead wires. On the north side of the street a 30-ft. pole with a 5-in. top was installed, while on the opposite side a 6-in. top was used because it was necessary to mount a crossarm carrying four feeder cables. One of the accompanying photographs shows a 35-ft. pole with a 7-in. top carrying the line at a feeder intersection.

This entire installation was handled by the men of the West Towns Railway. A tractor trail truck was used to transport the poles from the railroad side track to the job. They were then mounted in position by means of pike poles and a small improvised derrick. No other special construction equipment was required and the poles were lined up by sight, without the use of an instrument. This was done by setting the first two



Chicago & West Towns New Overhead Construction. A 7-in., 35-Ft., One-Piece Pole Is Used as a Corner Pole at Feeder Intersection

poles with a rake away from the street an amount equal to the taper of the pole, thus bringing the far side of the pole into a vertical position as indicated by a plumb line. The third pole was then aligned by sighting along the first two. This process was continued until the complete line was set. The accompanying photograph shows the result obtained.

Favorable comment on the installation has been received by the company from citizens and the village officials. An object of widening the street was to make it a very attractive thoroughfare. With the street light poles placed every 100 ft. along each side of the street and the railway poles every 110 ft., the appearance of the completed job has met with general approval.

Electric Railway Income Tax Statistics

THE following figures for electric railway companies appear in the report of the Commissioner for Internal Revenue on the income tax for 1921, just issued by the Treasury Department:

INCOME TAX DATA OF ELECTRIC RAILWAYS FOR 1921	
Total number of corporations reporting	458
Corporations reporting net income:	
Total number	211
Amount of net income	\$33,843,158
Income tax	8,276,532
War profits and excess profits tax	570,914
Total tax	\$8,847,446
Corporations reporting no net income:	
Total number	241
Deficit reported	\$202,585,944

Meter Practice Followed on the Sacramento Northern

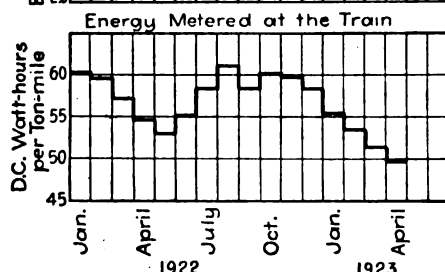
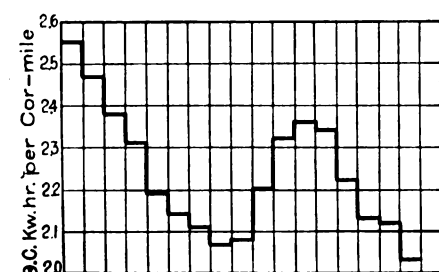
**Nearly 9 per Cent Energy Saving per Car-Mile Over
1922 and Still Greater Over 1921—
Vacations as Prizes**

BY W. H. EVANS

**Electrical Engineer Sacramento Northern Railroad,
Sacramento, Cal.**

IN NOVEMBER, 1921, the Sacramento Northern Railroad completed the installation of Economy watt-hour meters on nineteen of its interurban cars, and beginning with January, 1922, accurate records were kept each day of the energy consumption of the various motormen and the various trains.

Each month the average unit performance of each train is arrived at and compared with the performance of the same train during the preceding months. As practically every train has either a different combination of motors and trailers or different schedule conditions to



Energy Consumption Figures for Seventeen Months

to his power-saving record for that six months. For each six months interval, the motorman with the highest percentage saving of two-car trains or more receives seven days vacation with pay and the second highest, five days vacation with pay. For single-car trains the highest ranking motorman receives five days vacation with pay.

Meter cards are made out by the motormen and handed in each day at the end of their runs with the information filled out concerning their run. A typical meter card is reproduced. In addition, the terminal inspectors read the meters of each motor car when the train is turned over to the motorman and when it is received back from the motorman at the various terminals. This, in addition to providing a check on the motorman's readings, allows us to obtain the energy consumption of the trains stored and handled in the terminal yards.

The meters are connected so as to measure the entire input to each motor car, including not only energy for traction purposes but also for air compressors, heaters and lights. By so doing we are able to obtain an accurate record of all energy used in interurban passenger service and have found this information valuable for statistical purposes in the segregation of certain expenses between passenger and freight service and in

working up data as to cost of operation of various trains and various combinations of equipment.

The meters are equipped with inspection dials, but we have not yet depended upon the use of these dials to any great extent in handling inspection, as mileage records of the various classes of equipment have to be kept for other purposes. They are available therefore as a means of determining when equipment is due for oiling, inspection, etc.

The records for some fifteen to twenty interurban motormen are tabulated daily and summarized at the end of each month in order to arrive at unit consumption figures for each run for each motorman. This work requires about twenty-five to thirty hours per month. The cost of inspection and maintenance of the meters to date has been very small.

The accompanying tabulation showing direct-current kilowatt-hours per car-mile and direct-current watt-hours per ton-mile for the first five months of 1923, as compared to the same five months in 1922, indicates a saving in these five months of about 8.9 per cent. This percentage saving, when applied to the energy consumed per annum for interurban passenger service, will represent a saving in 1923 over 1922 of approximately \$4,600.

SACRAMENTO NORTHERN R. R.						METER CARD			
MOTORMAN <u>F. J. McManus</u>						DATE <u>June 8 28</u>			
TRAIN NO.	CAR NUMBER		STATIONS		METER READING		C. W. N.	CAR MILES	
	HOPPER	TRAILER	START	END	START	STOP		HOPPER	TRAILER
<u>16</u>	<u>130</u>	<u>224</u>	<u>Soo</u>	<u>Ehi</u>	<u>3453</u>	<u>3841</u>	<u>388</u>	<u>9487</u>	<u>9487</u>
<u>25</u>	<u>106</u>	<u>228</u>	<u>Ehi</u>	<u>Soo</u>	<u>4512</u>	<u>4994</u>	<u>412</u>	<u>9325</u>	<u>9322</u>
REPORT UNUSUAL OCCURRENCES ON BACK OF CARD							TOTALS		
							<u>14822 18922</u>		

Typical Meter Card

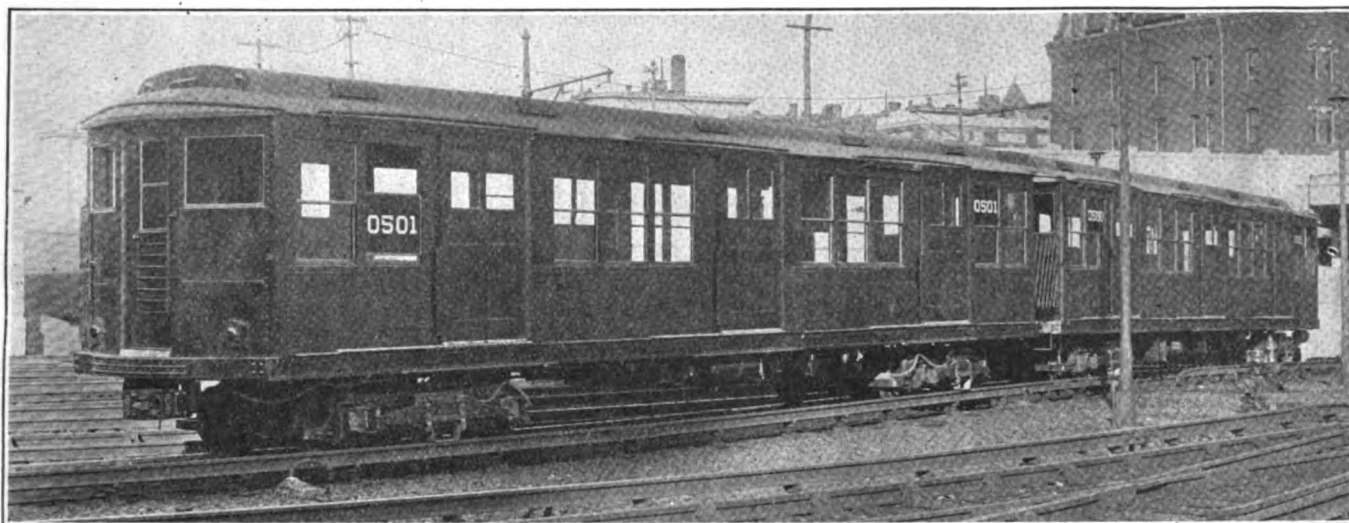
As the entire meter installation cost approximately \$2,000, this yearly saving amounts to approximately 230 per cent return on the investment.

It will be noted from the tabulation and the graphic chart that the average unit consumption decreases from a maximum in January to a minimum during the summer months, rising again during the fall and winter months of the year. This is due to the increased train friction during the colder weather, as well as the additional use of energy for car heating and lighting.

ENERGY CONSUMPTION IN INTERURBAN PASSENGER SERVICE OF SACRAMENTO NORTHERN					
	Direct-Current Kilowatt-Hours per Car-Mile		Direct-Current Watt-Hours per Ton-Mile		Per Cent Saving per Car-Mile, 1923 Over 1922
	1922	1923	1922	1923	
January.....	2.55	2.34	60.2	55.3	8.2
February.....	2.47	2.22	58.5	52.7	10.1
March.....	2.38	2.13	56.4	50.4	10.5
April.....	2.31	2.12	54.5	49.7	8.3
May.....	2.19	2.03	51.6	....	7.3
June.....	2.14	....	50.2	....	....
July.....	2.11	....	49.8	....	....
August.....	2.07	....	51.5	....	....
September.....	2.08	....	48.9	....	....
October.....	2.20	....	57.6	....	....
November.....	2.32	....	54.8	....	....
December.....	2.36	....	57.0	....	....

The train make-up averages 62.3 per cent of motor cars and 37.7 per cent of trailers.

It will be noted that the average consumption for 1923 is running about 8.9 per cent less than for the same months in 1922. There is no doubt also but that the average unit consumption during 1922 was less than during 1921, when meters were not installed. Therefore the total saving which our men have made has undoubtedly been greater than the 8.9 per cent obtained in 1923 over the 1922 figures.



Two of the New Steel Cars to Be Used in the East Boston Tunnel

Relief Effected by Train Operation in East Boston Tunnel

By the Addition of a Terminal Station at Maverick Square in East Boston and New Rolling Stock—Rapid Transit Service Will Be Substituted for Surface Car Type of Service—Rush Hour Capacity of the Tunnel Will Be Increased 136 per Cent

By Edward Dana

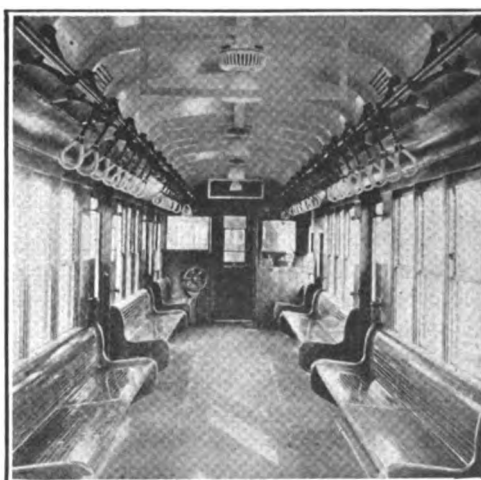
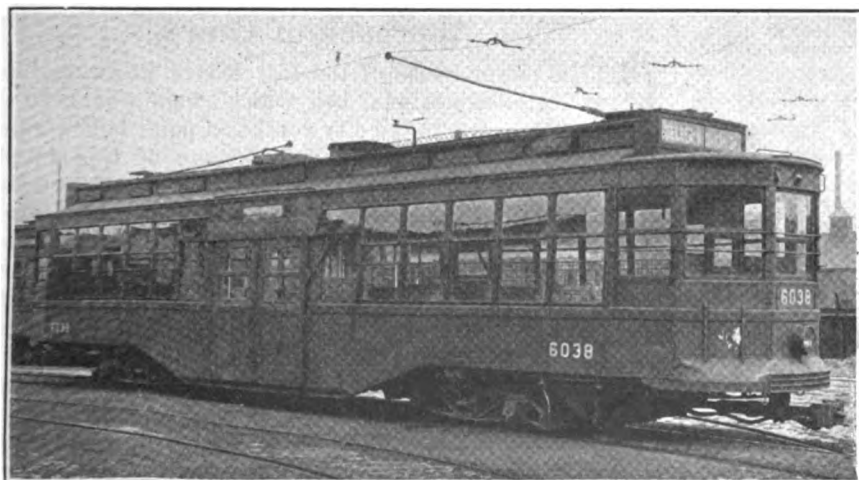
General Manager Boston Elevated Railway

THE East Boston Tunnel was originally constructed by the Boston Transit Commission under Sec. 17, Chap. 500, Acts of 1897. Work was begun on May 5, 1900, and the tunnel was open for public travel on Dec. 30, 1904. The total cost of this section of the tunnel was \$3,370,000 and the approximate length 1.42 miles. The tunnel runs 82.3 ft. below low water at the bottom of the masonry. The maximum grade is 5 per cent for a total length of 880 ft.

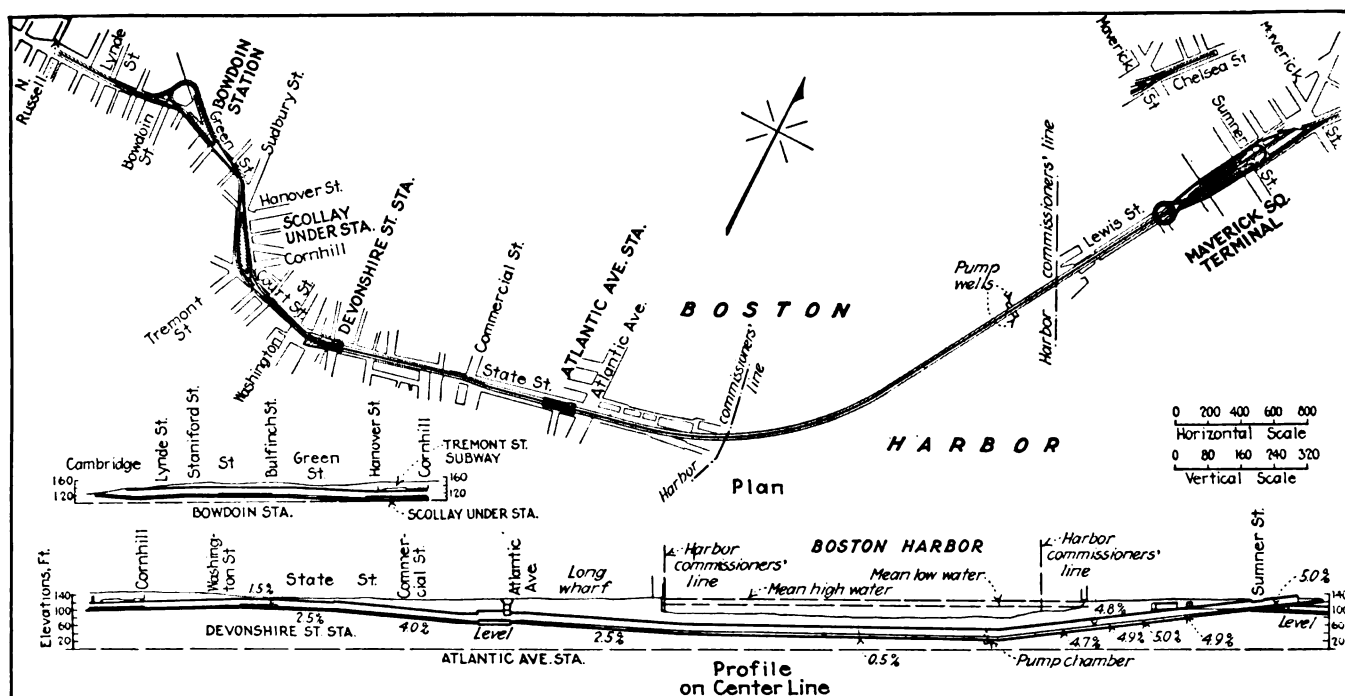
An extension of 0.41 mile to Bowdoin Square was authorized by Acts of 1911, Chap. 741, and work on this section was commenced on Nov. 9, 1912. It was completed and operation started on March 18, 1916.

This extension cost \$2,287,000 and afforded relief and ushered in a period of greater use. The shifting of the trolleys on the cars at Devonshire Street Station, the original terminus, had reached an unbearable point. This extension also permitted the bodily transfer of passengers at Scollay Understation to cars operated in the Tremont Street Subway.

Up to the present time tunnel service has been supplied by surface cars which have entered and left the tunnel at the East Boston end. On March 1, 1924, there will be completed the Maverick Square Terminal in East Boston, which will then separate the tunnel operation from the surface tracks in East Boston and



At Left, Center-Entrance Car Now Used in East Boston Tunnel. At Right, Interior of New Steel Cars



Plan and Profile of East Boston Tunnel, Showing Position of Maverick Square Station at East Boston End of Tunnel

permit only steel trains to be operated in the tunnel. This terminal and its connections will cost \$2,500,000, which makes a total of \$8,157,000 for the approximate construction cost. In addition, \$904,879 will have been expended for equipment in the tunnel since it was constructed in 1904, making a grand total of \$9,061,879.

The steel cars which are now being equipped in the company's shop are unique in many ways and were described in the *ELECTRIC RAILWAY JOURNAL* of Jan. 13, 1923.

The summary of statistics of these new cars as compared with the present center-entrance cars is as follows:

	East Boston Tunnel Cars	Center Entrance Motor Cars
Length over all.....	47 ft. 3 in.	48 ft. 9½ in.
Height from top of rail to top of roof.....	11 ft. 3½ in.	11 ft. 7½ in.
Width outside sills.....	8 ft. 3½ in.	8 ft. 5 in.
Width over all.....	8 ft. 7 in.	8 ft. 8½ in.
Width of side doors.....	3 ft. 9 in.	6 ft. 6 in.
Diameter of wheels.....	26 in.	24 in.
Seated passengers.....	44	56
Standing passengers.....	136	95
Sashes.....	Brass	Wood and brass
Roof.....	Monitor arch	Monitor
Ventilators.....	Perry	Perry
Flooring.....	"Truss Plate" with Mastic Coating	Wood
Door engines.....	Consolidated Car Heating Company (elec.)	Consolidated Car Heating Company (pneu.)
Electric pneumatic brake.....	West, var. load (automatic)	West, S.M.E.
Motors.....	4 West-514-E	4 GE-247
Controller.....	GE P.C.-5	GE P.C.-5
Car straps.....	Rico	Leather
Manufacturers of car bodies.....	Pullman Company	Brill
Weight.....	44,400 lb.	45,000 lb.

It is expected that by March 1, 1924, steel trains will be in operation in the East Boston Tunnel between Maverick Square on the East Boston end and Bowdoin Square on the Boston end. The relief to passenger traffic effected by this change in method of operation can hardly be appreciated when one considers that except for the terminal station at Maverick Square the tunnel is, to all intents and purposes, the same tunnel.

The average daily weekday passenger load has constantly increased as shown in the following table:

1905.....	33,118	1915.....	51,712
1906.....	37,434	1916.....	63,506
1907.....	40,864	1917.....	72,970
1908.....	41,086	1918.....	69,124
1909.....	42,072	1919.....	78,585
1910.....	44,719	1920.....	75,689
1911.....	46,353	1921.....	73,765
1912.....	50,445	1922.....	77,053
1913.....	54,526	1923.....	78,970
1914.....	54,678		

The capacity of the tunnel at the present time has been reached for surface car operation. It is only possible to operate 121 surface cars through the tunnel during the rush hours, though many of these cars were connected up as three-car trains. The ultimate capacity (with six-car trains) under the arrangement made for operating steel trains will provide for 240 cars per maximum hour. As the maximum carrying capacity of the surface car is 151 and the new steel car 180, this increases the capacity of the tunnel 136 per cent in the rush hours. In the light of past growth in traffic, it is reasonable to suppose that this tunnel will be able to take care of the traffic for at least ten years to come.

Bell in Power House Announces Approach of Cars

IN THE power house of the Harrisburg Railways has been installed a signal bell which rings whenever a street car inbound to the city reaches a point half a mile beyond the power house. The purpose of this is to enable the power house men desiring to go home to wait under cover until the car is close by. They then have just comfortable time to reach the nearest trolley station. Formerly the men used to go out and wait on the street corner, but after many hours work in the heat of the boiler room the waiting in the cold wind out doors was very injurious to the health of the employees. Last summer during track construction work signal wires were strung on the company poles along the street. Upon the completion of the track job the line foreman allowed some of these wires to remain and the signal bell was connected with a contactor by this means.

Building Good Employee Relations in Kansas City*

The Principles and Organization Plan of the Employee Brotherhood and Representation Plan Which Have Contributed to the Present Favorable Situation in Kansas City—Separate Committee Handles All Wage Matters—Membership in Brotherhood Is Entirely Voluntary

MORE and more is being heard of the fine relations existing between the management and employees of the Kansas City Railways. In view of the success that has been attained, it is interesting to present the company's view of the plan and its working. The company believes that its provisions for employee participation in the control of all matters relating to his welfare are novel, sound and successful and largely without parallel in the electric railway industry. Experience with the plan of co-operation in effect has demonstrated, it is felt, that these arrangements con-

tion in the control of wages and working conditions is entirely separate and distinct from all other organizations on the property. The brotherhood, to which 97 per cent of the men belong and which handles all benefits, is distinct from the committees for adjusting wages and working conditions. The company feels that it has no more right to enforce a closed shop for its own brotherhood than it would have for a union. The plan for collective bargaining also permits the employees to act independently. There is no company dictation. The men have the right to act and deliberate as men and, to

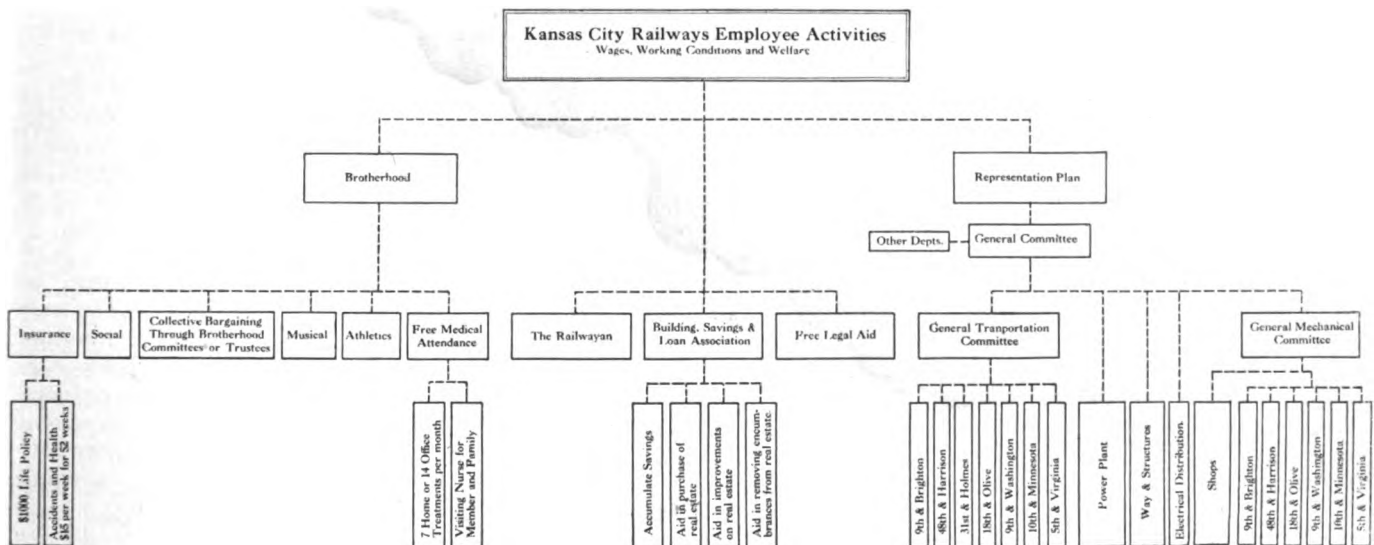


Chart Showing Kansas City Railways Employee Activities

tribute in a vital way to every phase of the transportation service rendered. In fact, the cordial co-operation between the management and employees has been considered the very mainspring of the achievements and progress noted in respect to other phases of the railway operation.

In building up the various organizations and activities which have a bearing on employee relationship, the following ideas have been kept in mind as the cardinal principles, some of them differing fundamentally from the old accepted ideas:

1. There is no welfare work in the ordinary sense of the term on the Kansas City Railways. Men have the right to accept benefits of one kind and another, if they so desire, and not otherwise. The men pay for a large proportion of such benefits, and while the company assists financially, this assistance is never mentioned.

2. Membership in company organizations is purely voluntary.

3. The machinery for providing employee participa-

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

carry out this thought, meetings are regularly held in every carhouse and in every department.

4. It is maintained that there should be no secrets. Every man on the property should know what is going on, what the company is doing, what the financial reports show. These things are explained so that they may be understood. Any man, trainman or otherwise, works better when he works intelligently and when he knows the results of his work are an integral part of the organization. At the regular meetings these matters are all explained by company officials.

The above four statements represent the platform upon which the company's employee relations have been constructed. The two outstanding features are the representation plan and the brotherhood.

THE EMPLOYEES' REPRESENTATION PLAN

The representation plan of the Kansas City Railways employees provides for co-operation in the operation of the railway system. Its objects are as follows:

1. To insure to every employee exact justice in all matters of discipline or discharge.

2. To settle or adjust properly all questions affecting wages and working conditions.

3. To provide for compulsory arbitration in a court of last resort.

4. To insure co-operation between employees and management in all matters affecting the operation of the company and the welfare of its employees.

5. To insure continuous, uninterrupted transportation service to the public.

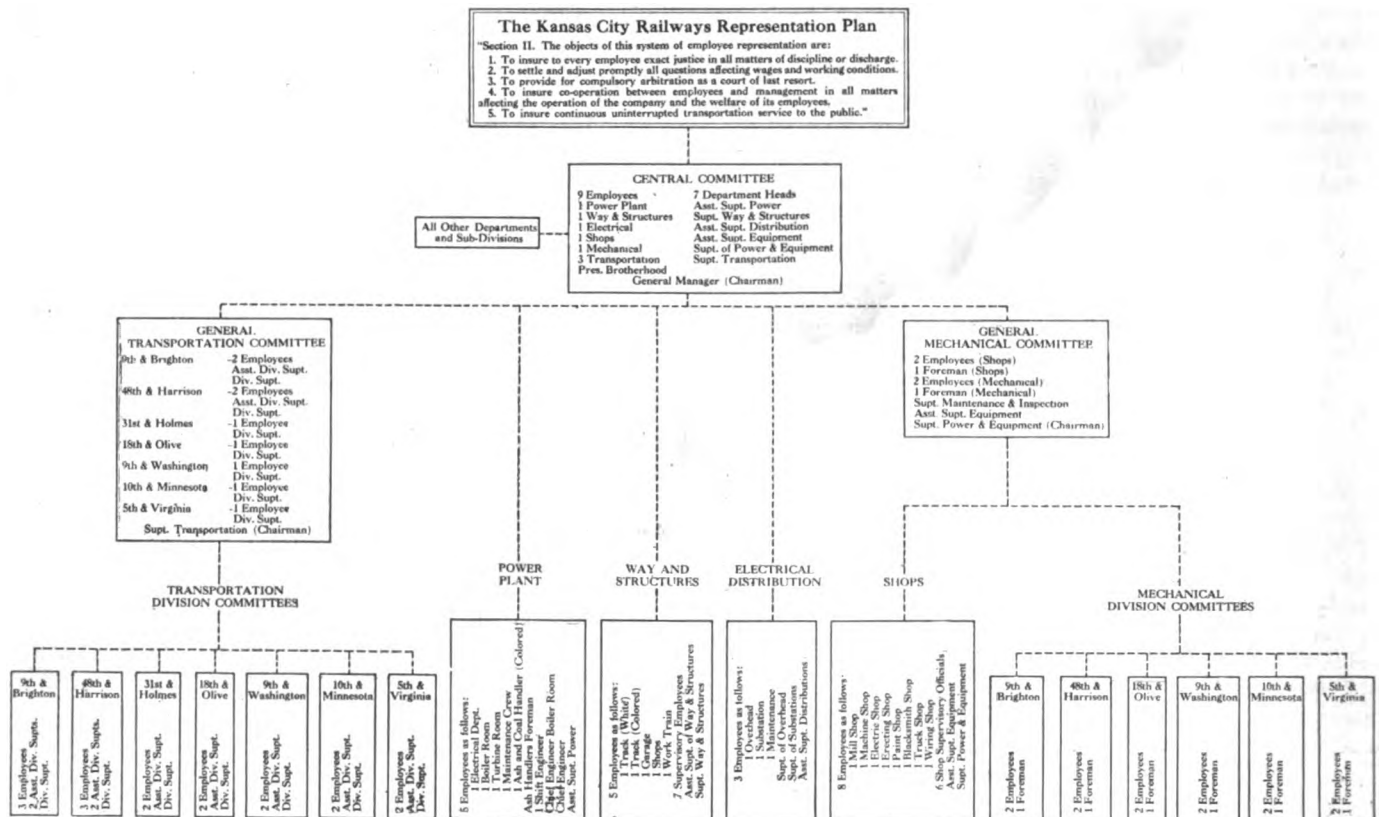
The make-up of this organization is shown in an accompanying organization chart. There is provided an annual election in which every employee has one vote in selecting the committees representing the divisions, departments and separate units of the property. Elected representatives from these committees form department committees and finally a central committee, as shown in the chart. These committees also have management

was organized two years ago, and it is now being extensively copied by many other industries.

THE EMPLOYEES' BROTHERHOOD

The Employees' Brotherhood of the Kansas City Railways is a voluntary organization governed entirely by the employees and formed for the purposes outlined in the constitution as follows:

"This organization is formed for the purpose of perfecting ourselves in the performance of our duties, to secure safe, continuous and reliable transportation service for the people of the Kansas Cities and vicinities, in so far as it is in our power to accomplish, and to promote frankness and a friendly spirit between ourselves and the officials of the company, having at all times due regard for the rights of the public. This association is founded upon our belief that we, as employees of the



representation in the persons of various officials, but the employee members ordinarily outnumber the official members.

The employees of each committee have separate chairmen, and at their request they can meet and act independently of the representatives of the management. These committees have the right to discuss and take up any question in connection with the operation of the system. Arbitration is provided for in the event that any matter comes up which cannot be finally disposed of in the central committee.

This representation plan has been in continuous operation since April 1, 1919, at which time it was adopted by vote of all employees. It has since been twice slightly revised. During the past two years the plan has worked so successfully that the department committees have handled all matters except two, which were appealed to the central committee, and settled there. The plan is very similar to that upon which the packing industry

Kansas City Railways, are able to manage and take care of our own affairs and to look after our own interests without interference, advice or dictation by any individual or foreign organization; also that any organization of this nature should not have for its sole purpose only the welfare of its members, but that the spirit of loyalty to and co-operation with the company should be encouraged, and in the last analysis the welfare of the public should be paramount; that our employment is of a quasi public nature, which is too necessary for the public welfare to be interrupted by strikes of any nature whatsoever."

The brotherhood is the medium for contributing all benefits and for handling all social activities. All employees are eligible upon signing the constitution and agreeing to pay \$1.75 per month. The direct benefits offered by the brotherhood are as follows:

1. A \$1,000 life insurance policy. No physical examination is required, and all employees belonging to the

brotherhood are also privileged to take out \$2,000 additional insurance if they so desire.

2. A non-cancellable accident and health policy, which pays \$15 a week for fifty-two weeks.

3. Free medical attendance, the brotherhood maintaining a corps of physicians, one located near each station, whose services are free to all brotherhood members.

4. Free nursing service through an arrangement with the visiting nurses' association.

5. Special entertainment, such as dances, picnics and other parties. The funds for this purpose are prorated among the various divisions and departments.

6. An eight-team baseball league, which plays upon a park owned and controlled by the brotherhood.

7. A fully equipped and well trained band.

8. The brotherhood furnishes counsel and handles the case of any employee who has been disciplined and who desires to present his case before one of the representation committees.

9. Free legal aid. An attorney is maintained by the brotherhood and his services are at the disposal of any member for any purpose.

10. A co-operative grocery store where food products may be bought at cost.

11. Completely equipped restaurants in the shops, power plant and divisions, where well cooked meals are served at cost price.

The brotherhood is managed by a board of sixteen trustees, all selected by the employees from the various divisions and departments.

Another part of the employee work on the Kansas City Railways is that of the Kansas City Railways Building, Savings and Loan Association. This organization is managed by the employees. It was organized in 1917 and today has assets of over \$300,000. The employees are contributing savings at the rate of \$10,000 monthly. Interest, compounded semi-annually, is paid at the rate of 6 per cent, and this money is loaned only to employees on real estate for house-building purposes.

Another important instrumentality in fostering good relations between management and employees is the publication monthly of an official magazine, the "Railwayman," under the supervision of the brotherhood trustees.

SOMETHING OF THE RESULTS OBTAINED

It would be difficult to find a finer spirit of co-operation than that existing in Kansas City. The employees' organization has been subjected to numerous tests and has never failed to respond. As with public good will, it is extremely difficult to show tangible results from work of this kind, but the management believes that many phases of the showing made on this property in the last few years are directly traceable to the spirit existing among the employees. As examples of the ways in which this relationship has given tangible results, the following are cited:

Straight platform time only is paid, with the exception of five minutes for taking out and putting away cars and thirty minutes for an accident report. There are no so-called straight runs on the system, all daylight runs have noon release of from one hour and forty-five minutes to two hours and thirty minutes. The average run is 10.4 hours and no overtime is paid.

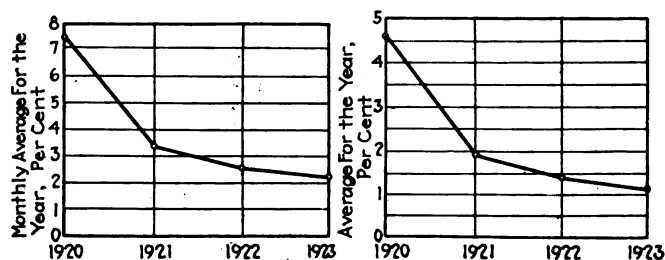
A monthly guarantee of \$110 for all show-ups and for accepting all work offered costs the railway company, with its 1,800 trainmen, an average of less than \$125 a month, this being the amount paid on guarantee over actual time worked.

In reducing forces, efficiency only is taken into consideration, and at every shake-up the least desirable men are laid off without controversy.

The brotherhood trustees and the various committee men, numbering 250, form a standing committee for the purpose not only of adjusting grievances but for securing better, more courteous and more economical service. Ninety per cent of the work of these committees is along such lines.

On every occasion the employees have manifested a most cordial and helpful feeling toward the company. For example, at numerous jitney hearings before the City Council the employees have presented petitions and their committees have appeared before these hearings to protest against the operation of jitneys.

When the property went into the hands of receivers the employees presented petitions to the courts and employed an attorney to represent them in the receivership proceedings, and their only request was that the rela-



Effects of Improved Employee Relations on Labor Turnover

At left, voluntary resignations and discharges of trainmen. At right, per cent of inspections showing irregularities in fare collection.

tions that existed be not disturbed and that nothing be done by the court or receivers that would permit the Amalgamated to secure a foothold. Several resolutions have been passed by the employees on special occasions during the past two years expressing similarly their satisfaction with the present conditions and emphatically discouraging any idea of unionization.

The Kansas City Railways exercises the same care in securing the proper class of employees, mentally and physically, that it does in purchasing machinery or equipment. Employment rules are very rigid. In so far as possible only men under thirty-six years of age are accepted for employment in any department. A strict insurance examination is given and applicants in all departments must meet this physical requirement. Bad teeth and other physical defects must be attended to before the company physicians will certify the applicant.

No man is employed who has worked for any other system. This is done for several reasons, one being to protect the property against men with positive views on labor matters irreconcilable with the brotherhood and representation plans. Another reason is that the company considers it better to instruct and educate its men in its own methods rather than to employ men who have had previous experience in other methods.

Photographs are taken and a record kept of the service performed by every employee in every department of the company. These photographs are sent with reference letters and all references checked up in Dun's and Bradstreet's. Fifty per cent of the employees are ex-service men. Old and disabled employees, whose length of employment justifies such action, are retired on a pension. The average monthly pension is \$50.

In September, 1922, the company instituted schools of instruction for employees. The employees meet weekly

and lectures are given by officials on all details of operation, mechanical and electrical matters, etc. A foreman's association, made up of all foremen, assistant superintendents and division superintendents, meets monthly. Lectures and instruction are provided by qualified men in the industry. Through arrangement with the International Correspondence Schools, 200 employees are taking courses. These men are assisted weekly by the technical men on the property.

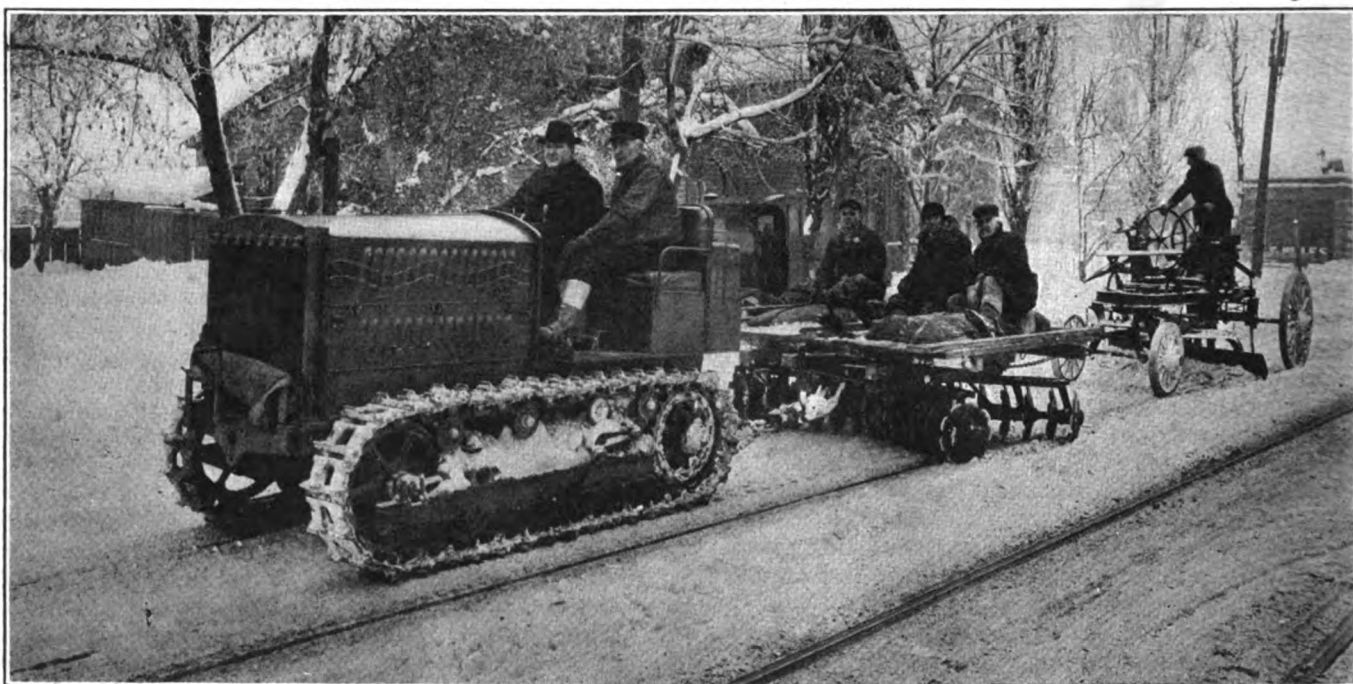
"Better Service" Slips for Comments of Passengers*

ON THE lines of the El Paso Electric Railway all inspectors and trainmen are supplied with pads of "Better Service" slips, on which may be written any comments which come to their attention regarding the service. These comments are sometimes complimentary, and sometimes unfavorable, but in any event

Snow-Fighting Equipment in Spokane*

ALTHOUGH severe snows are not very common in Spokane, Wash., and a comparatively small snow-fighting equipment is required, occasionally there takes place what for Spokane is a very heavy fall. Such an event occurred last winter on Feb. 12, 1923. All of the snow-fighting equipment, including three rotary sweepers and two large shear plows, was put promptly into service. Even this equipment seemed at first inadequate to care for the storm, which was the most severe in the history of the company, especially as it was accompanied by high winds, which caused heavy drifts. Obviously some special efforts were required to keep the lines open, especially to clear the snow from the special work in the downtown district, and the ingenuity of the management was called into play.

Recourse was finally had for this kind of service to tractors with road graders and harrows, a 5-ton tractor



Ten-Ton Tractor Hauling Heavy Duty Disk Harrow and Road Grader to Clear Track of Ice and Snow in Spokane

the slip is made out and is turned in to the proper department, where it receives immediate attention. Many suggestions from passengers are thus conveyed to the management and whenever possible are adopted, not only benefiting the service itself but almost invariably arousing the appreciation of the person making the suggestion.

Warning Sign on Trolley Rope Protects Worker

THE Conestoga Traction Company, Lancaster, Pa., has reduced the danger of accidents to men working on the electrical car equipment in the railway shops by using a danger sign which is hung on the trolley rope. During repairs to controllers, circuit breakers, etc., the trolley pole is pulled down from the overhead wire. A small sign lettered in white on a red background reads: "Danger, Don't Put Up Trolley." This sign is fastened to a spring clasp which grips the trolley rope. As soon as the trolley pole is pulled down from the wire the warning sign is hung on the rope and it remains there as long as the electrician is working on the car.

pulling a road grader. Sixty men from the line, track and bonding crews followed, assisted by 140 extra snow shovelers.

In the following twenty hours the company used a 10-ton tractor pulling a rotary disk harrow, followed by a grader, to cut out the packed snow and ice between the rails. This method, first used in an emergency to keep the motors from dragging and lifting the wheels from the rails, was found unusually successful. As far as the company knows, it is the first to use a rotary disk harrow in fighting snow and ice on the track. The disk was found to be the only implement that would cut hard ice down to the pavement without doing damage to the pavement.

The harrow used was a "heavy duty implement," made more heavy by being loaded with sand bags, and on account of the angle in which the disks are set, the ice is easily chipped out. This eliminates expensive labor cost in cutting and flanging with picks. The illustration shows the equipment at work.

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

Arbitrators Specify Detroit Payments

The Report of the Board Discusses the Sums Payable as "Cost" and "Compensation" by the Detroit United Railway to Secure the Entrance of Its Interurban Cars Into the City of Detroit

WHEN the city of Detroit took over the city tracks and equipment of the Detroit United Railway in Detroit the contract between the city and the company provided that the latter should be allowed to use the city tracks for its interurban and suburban service substantially as was the case at the time the contract was signed. It was provided that these cars were to be operated by the crews of the company, that the company should pay all claims for damages caused by this operation while on the city tracks and that the cars should not carry local passengers. For the use of the track and power required by the cars while on these tracks the company was to pay the city "such compensation as may be fixed by agreement . . . or by arbitration." The contract also provided a somewhat different basis for certain other track belonging to the Detroit United Railway originally part of the interurban lines outside the city limits, but brought into the city through the annexation of the territory. Although the franchise on these lines had not expired and the company did not want to sell them, the city finally took them over because it thought it should own all the street railway tracks within the city limits. On these tracks, the contract specified, the company was to pay nothing for the use of the tracks and to pay only the "cost" for power. As it was impossible to reach an agreement the subject of the amounts which the Detroit United Railway should pay the Department of Street Railways for this use of city tracks was referred to a board of arbitration, consisting of William E. Davis, Cleveland, Ohio, chairman; Harold M. Gould, electrical engineer of the department, for the department, and Prof. Henry E. Riggs, University of Michigan, for the company. The news columns of this paper have given an outline of the decision of the board, recently rendered, but a more extended abstract follows:

MEANING OF "COMPENSATION" AND "COST"

In the arbitration the first question the board had to answer was what is meant by the terms "compensation" and "cost," as used in the contract, and to what extent if any either includes a return on the investment and deferred maintenance and rehabilitation charges. After extended discussion and quotation of cases, particularly *Knoxville vs. Knoxville Water Company*, 212 U. S. 13; *Boston & Worcester Railroad Corporation vs. Western Railroad Corporation*, 14 Gray's Reports, Mass. 255; *Metropolitan Railroad Company vs. Quincy Railroad Company*, 94 Mass. 271, and *Metropolitan Railroad Company vs. Highland Railroad Company*, 118 Mass. 291, the board decided briefly as follows:

"That 'compensation,' as used on the contract of March 10, 1922, means something more than 'cost.'

"Cost is clearly limited to a repayment of a proper proportion of all actual outlay for the proper maintenance and repairs of jointly used property, a proper proportion of all operating costs incurred by reason of joint occupancy, and of taxes, and of the cost of replace-

ments of parts of the property as they wear out in service under the present owner; and over and above these, the board holds that some reasonable payment shall be made for the use of capital invested in the jointly used property (including working capital), which the board determines shall be the average rate of interest paid by the city.

"Compensation includes all of the elements included in cost, plus an increased rate of interest above that actually paid. This added increment the board has fixed at 1½ per cent after full consideration of cost of money to corporations and municipalities."

It was also determined that the value of the property should be considered as that at which it was taken over by the city, plus the cost of additions, betterments and rehabilitation, or, in the case of plant and equipment owned by the city and not acquired from the company, the cost of rehabilitation was not included.

CAR-MILE OR TON-MILE BASIS

Witnesses for the city contended that the heavier equipment of the Detroit United Railway caused excessive maintenance of roadway structures and overhead lines, whereas the company argued that the damage to the tracks was not in proportion to the weight of the cars, as the interurban cars ran at a more uniform and lower maximum speed, did more coasting and made fewer stops and starts. The company also contended that the "ton-mile basis" meant greater complication of accounting, especially as with passenger cars it would require an assumption of the average length of passenger ride and average weight per person.

The board decided in favor of the ton-mile in expenses relating to way and structures, equipment, conducting transportation and power, but to simplify calculations on this basis decided that from May 15, 1922, to June 30, 1923, an average freight load of 9 tons be taken for all the company's freight cars and an average load of 3 tons for all the city's freight carrying service cars. For all determinations after June 30, 1923, the average weight of freight carried by the two classes of equipment is to be determined monthly and applied, while for the passenger cars and non-freight carrying service cars the equipment weight only will be taken.

ALLOCATION OF OPERATING EXPENSES BETWEEN JOINT USE AND SOLE CITY USE

The allocation of department expenses, outlined by the accounting officers of both sides, follows:

(a) *Way and Structures.*—Superintendence of way and structures (account 1) is prorated over and added to accounts 2 to 27 inclusive.

Equalization is to be cleared at the end of every fiscal period.

Track and track structures, accounts 2 to 27, except account 24, are considered as joint use. Account 24 is considered as joint use in the proportion that the cost of jointly used buildings for other than power purposes bears to the total cost of buildings not including those used with power.

(b) *Maintenance of Equipment.*—Superintendence of equipment is prorated over the other accounts.

All cars and rolling stock are considered as exclusive city service, except the service equipment and locomotives, which are considered joint.

Air compressors in air charging stations are considered as joint or exclusive city service on the basis of actual use.

All other shop equipment, shop expenses and miscellaneous equipment expense, and accounts 40 to 43, if used, shall be considered joint as they relate to service cars. Allocation is made in the ratio of jointly used city service car ton-miles to the total city ton-miles.

Vehicles and horses are considered as being entirely for joint use.

(c) *Power*.—All power accounts shall be considered as joint use.

(d) *Conducting Transportation*.—Superintendence of transportation is prorated over the other accounts.

Accounts 64, 65, 68, 69, 76 and 77 are applicable entirely to the Department of Street Railways.

Accounts 66, 74, 75 and 78 are entirely for joint use.

All other accounts are considered joint to the extent that they refer to air compressors and air charging stations or service equipment.

(e) *Traffic*.—All traffic accounts shall be considered entirely applicable to the Department of Street Railways.

(f) *General and Miscellaneous*.—These accounts are allocated as between exclusive city use and joint use on various bases consistent with the method of allocation used in all previous accounts.

CONTRACT DIVISION INTO SCHEDULES "A" AND "D"

The contract establishes an arbitrary division of track purchased into schedules "A" and "D." On schedule "A" tracks the company is to pay "compensation" for the use of track and power. On schedule "D" tracks the company is to pay the "cost" of power, but is not to pay rental in any form for the use of such track, nor any part of the cost of maintenance or replacement of the track or facilities, except those required for power distribution.

In commenting on this provision of the contract the board says that the actual keeping of operating expenses separately between these divisions is impracticable, and allocation cannot be made with mathematical accuracy. Schedule "D" property consists of 18.2944 miles of track. The buildings now associated with this track are so insignificant they may be disregarded. The capital value of the property listed in schedule "D" can best be secured by determining the average cost of all the track system purchased by the city from the company and allocating costs between schedule "D" track and schedule "D" on the basis of single-track mileage. The division of operating expenses on the same basis recommended is the division of the entire amount of operating expenses (except power) allocated to joint use, by the total ton-miles or car-miles (applicable under the rules established in the decision) by all cars of both interests on this division.

GRANTS FOR SPECIAL DAMAGE

The city made claims for damages to rails, special trackwork and trolley wire because of the use by the D.U.R. of worn or wide tread car wheels and an overhead sliding current collector. The board eliminated all claims for damages due to alleged wheel wear, but at the request of both sides established, with their co-operation, a standard wheel wear gage for all foreign cars that may operate on city tracks.

In regard to the sliding shoe which is used extensively on the D.U.R., the board found that the company lubricates the trolley wires on all of its interurban lines where this collecting device is in use, but the city lines are not so lubricated, nor were they when owned and operated by the company. The board therefore decided, pending a further agreement between the two parties

as to the proper form of contact, that the company should lubricate at its own expense the trolley wire on all lines of the city over which it operates cars equipped with the present type of shoe. This lubrication should be applied at least three times a week.

ALLOCATION OF CAPITAL CHARGES

The division of operating expenses having been worked out, the report takes up the question of capital charges, i.e., "fair return" on the investment. The board found the total investment in physical plant, as of May 15, 1922, to be \$33,659,913, made up as follows: Cost to the city of lines built and equipment newly purchased by the city, \$11,502,659; cost to the city of the so-called "day to day" purchases, acquired for a lump sum, plus legal expenses, \$2,307,254; amount paid to company under purchase contract of May 15, 1922, \$19,850,000. The single track mileage is taken as 372.5931 on May 15, 1922, and 373.8510 on June 30, 1923.

It was also decided that a car-mile, and not a ton-mile, basis should be used for the division of fixed charges, because in this case there is lacking the element of increased cost due to the weight of cars, or if there is any greater investment, this investment is reflected by larger fixed charges.

The report then lists the capital accounts, according to whether they represent investment for joint use or sole use by the city, and it is found that of the total investment of \$33,043,673 in the property in schedule "A," that portion to some extent in joint use represents an investment of \$20,520,199, and the property used exclusively in city service represents an investment of \$12,523,474.

In regard to working capital, the board considered it should be included as part of the investment and to keep the computation simple made an allowance of 4 per cent on the fixed plant investment as working capital to include working cash capital and stores and supplies. The resulting amount was divided between the parties to the contract in the same proportion as the fixed plant was divided, namely, investment allocated to power to be on the ton-mile basis, and all other investment on the car-mile basis.

In the case of superseded, but still existing property, the board holds that retirement from actual joint service should result in the property being taken out of capital allocated to joint service. Only where the necessity for reserve service and the actual use of the particular unit in such service can be clearly shown should an exception be made to the rule just stated, and a reasonable time limit should be fixed, in which there should be actual use.

RATE OF RETURN

As the board had decided that the word "compensation" meant something more than cost, it had to determine a reasonable rate of return on the investment of the city. As the basis for the rate, the board decided that the weighted average rate of interest on all outstanding Department of Street Railways' obligations should be accepted, and that to this should be added, to cover the elements of excess cost of financing, cost of retiring securities, maintenance of credit, periods of financial depression, panic or other hazards, an additional $1\frac{1}{2}$ per cent, and that this rate should be applied to the investment (including working capital) in the jointly used property.

The board found that for the period May 15, 1922, to

June 30, 1923, the base rate, as so determined, was 5.5434 per cent, and so set this figure, plus 1.5 per cent, or a total of 7.0434 per cent, as the return for that period. It also found that for the month of July, 1923, the cost rate was 5.477 per cent and the compensation rate 6.977 per cent and recommended that the future rate be determined in the same manner, so long as the Department of Street Railways continues to have a funded debt. If all this debt should be paid off, the weighted average to be taken is that of all the city of Detroit indebtedness, for "cost," and that $1\frac{1}{2}$ per cent is to be added to this figure for "compensation." The board also directed that payments to sinking funds made by the Department of Street Railways to retire its capital obligations should not be taken into account in fixing "fair return" or "compensation."

TAXES AND DEPRECIATION

Although municipally owned, the street railways of Detroit are subject to taxes, and the city charter of Detroit provides: "The rate of fare on such street railway system shall be sufficient to pay . . . taxes on the physical property of the entire street car system, the same as though privately owned." The board decided that the actual amount of taxes (real and personal) paid on the jointly used property should be apportioned upon the ratios already outlined.

In regard to depreciation, the board considered that a property in proper operating condition is worth the entire investment in it and that any decrement or "loss in service life" represented by the difference between the 100 per cent operating condition and the 80 to 85 per cent physical condition may properly be ignored either in valuation or accounting for replacement. Continuing, the board declares that until such time as the city actually establishes a reserve for replacement there shall be no charge for "replacement" or "depreciation" included in the compensation to be paid by the company. When such reserves are established, a separation shall be made as between the joint property and property devoted exclusively to city service.

As giving an idea of the extent of the use of the city property by the interurban cars, the following table used by the board in the rental computation from May 15, 1922, to June 30, 1923, is given:

	Car-Miles	Ton-Miles
City	55,613,892.00	954,987,807
Company	3,148,324.98	97,881,915

Part of the power used on the street railways in Detroit is generated and part is purchased from three sources, namely, Detroit Edison Company, Michigan Central Railroad and Detroit United Railway. Altogether, for the thirteen-and-one-half-month period mentioned, the total energy generated and purchased by the city was 192,451,573 kw.-hr. For the purpose of determining the payment for power for the period mentioned, and for the future until the two parties should have agreed to some other base, the board laid down the following units, to be assumed as the energy used for the propulsion and heating of cars:

	Watt-Hours per Ton-Mile
Company and city passenger cars	120.4
Company service cars and city's non-freight carrying service cars	120.4
Company freight cars and city freight carrying service cars	61.6

For heating, for the period mentioned, between Oct. 21, 1922, and March 31, 1923, the figures taken were:

	Kilowatt-Hours per Car-Mile
Heaters on city safety cars (Birney type)	0.52
Heaters on city (Peter Witt) cars	1.17
Heaters on Lake Shore electric cars	0.648

Based on the agreement and adopted units, the energy consumption of the system for the thirteen-and-one-half-month period mentioned is computed as follows:

	Kilowatt-Hours
Total energy used in heating	4,296,961
Company passenger and service cars	10,456,753
Company freight cars	879,132
City passenger and non-freight carrying service cars	114,713,163
City freight carrying service cars	136,792
Total car propulsion and heating	130,482,801

Energy used for other than city car operation, as for shops, amounted to 12,029,746 kw.-hr.

The board estimated the total losses in distribution and unaccounted for at approximately 25 per cent.

For the thirteen and one-half months under consideration the total cost to the city for power generated and purchased was \$2,258,558.65, or \$0.012022 per kilowatt-hour, and as the word "cost," as defined, includes the elements of interest on the investment, the board fixed the figure for payment at \$0.015410 per kilowatt-hour for "cost" and \$0.015860 per kilowatt-hour for "compensation."

SUMMARY OF AWARD

Based on the considerations mentioned, the board made the final award:

TO THE CITY	
Compensation for use of Division A tracks (including all general and miscellaneous and taxes)	\$257,916.04
Power on Division A (excluding general and miscellaneous and taxes)	205,809.30
Total compensation on Division A (without interest on deferred payment)	\$463,725.34
Cost of power on Schedule D tracks	39,723.20
Interchange power, sold by the city to the company	32,229.53
Total due the city on award (without interest)	\$535,678.07
Interest on deferred payments	14,284.75
Total amount due the city on award, including interest on deferred payments	\$549,962.82
TO THE COMPANY	
Interchange power, sold by the company to the city	\$55,158.60
Interest on deferred payments	1,470.89
Total amount due the company on award, including interest on deferred payments	\$56,629.49

The report occupies eighty-nine pages of a printed report. Included also in the report are an abstract of the findings, a list of the exhibits and a report of the energy consumption of cars and heaters. An abstract of this report on energy consumption will be published in a later issue of this paper.

EFFECT OF DECISION

On Dec. 19, following the report of this decision, the *Detroit Times* said that the sum mentioned above as that which the Detroit United Railway owes the city for power and use of tracks during the last thirteen and one-half months was considerably less than had been estimated by the city. According to the *Times*, the report for November for the municipal railway, printed before the board findings were announced, contained an estimated income of \$78,786 for rent of tracks and facilities during the month. The decision would cut the department's November net earnings from \$60,000 to approximately \$21,000 and the net profits for the fiscal year ended June 30, 1923, from \$938,000 to something less than \$400,000.

Railway Facts by Radio

Edward Dana Broadcasts an Explanation of Boston Elevated Conditions—Also Some Statistics on Boston Transit Requirements

THE radio authorities of Boston recently arranged with Edward Dana, general manager Boston Elevated Railway, to give four talks over the radio on railway conditions in Boston. Two of these have already been given, and were sent out from stations WNAC and WGI. Both related primarily to conditions on the Boston Elevated. Portions of these talks are reproduced below in the belief they may be of help to other railway managers who may be asked to give similar talks:

Evening finds the majority of those who constitute the large army of car riders enjoying home comforts. Even those whose patience is sorely tried during the evening rush hour, I feel sure, will gladly spare a few moments to reflect upon the problem of transportation which so vitally concerns everybody. Radio broadcasting, one of the marvels of our age, offers me the opportunity denied to the managers of yesterday.

The organization (which I represent) of 10,000 of your fellow citizens who render this necessary transportation service you require appreciate the opportunity offered by radio broadcasting. Under our present service-at-cost arrangement these 10,000 individuals become public servants and not profit-seekers, and they are concerned only in rendering the best service which the revenue received will allow. I can assure you that these men and women as a body appreciate this fact and are sincere in their desire to render satisfactory service.

They likewise go home after the rush hour just as you do. Their children go to school with your children. They attend church with you and the strain of the rush hour is just as much theirs as yours. The problem is a mutual one, and like all such problems is best solved when all concerned attempt to realize the difficulties and co-operate to overcome them.

Those of you who own automobiles and have taken a trip without allowing any too much leeway can remember your emotion when you faced a 10-mile detour. It was an annoyance. It may have irritated you, especially if the country road over which you detoured was poor and you may have been late for dinner, but you adjusted yourself to the difficulty, and, because you were your own master, it may be that you made up some of the lost time. But when a trolley car under similar circumstances comes to a drawbridge that is open, a railroad crossing blocked by a train, a fire, broken-down trucks or other obstructions, or a traffic jam, there is no detour. The car which for ten minutes is held up by an open drawbridge at half-past four would have passed through Park Street Subway station at five o'clock. The ten minutes it lost earlier cannot be made up, and the rush hour conditions are made worse. The passenger who is delayed and crowded cannot understand the reason because it happened a half hour before and miles away.

Your railway—the Elevated—carries 380,000,000 people a year. That is more than twice as many passengers as are carried on all the lines of the New England steam railroads. That is nearly four times the population of the entire United States.

To carry this traffic 52,000,000 car-miles are operated a year, which is equivalent to 109 round trips to the moon and over half the distance to the sun.

The tons of coal burned annually to generate the electric current which moves this traffic are 278,000. That amount of electric current would keep a 36-watt light burning in your front hall for 811,918 years.

Under modern conditions, winter and summer, snow or rain, we are so close to this service that we fail to appreciate its proportions, and we fail to notice its good qualities, what it means to us as the very life-blood of our metropolitan city. We are all too prone to criticize it for its weak points and its lack of detours.

The old idea or attitude toward a street railway was to regard it as a rich corporation and anything that could be got out of it as velvet. Such an idea today with reference to the Boston Elevated simply reacts to injure the car riders themselves.

Reduction in operating costs in the last two years has made possible the establishment of 5-cent lines, until now

more than 300,000 passengers every day pay only a 5-cent fare. Anything which further reduces the cost helps to make possible these routes and the improvement of the service. On the other hand, when unnecessary expenses are forced on the railway it tends to restrict these routes and to prevent the improvement of the service.

When a demagogue argues that the Elevated should bear this or that expense or cart away all the snow from the streets where it has tracks, it still sounds good to some people, but what it really means is that a large number of car riders will pay a larger car fare than they would otherwise have to pay.

Similarly as to service. When a street car carrying fifty passengers is repeatedly held up by traffic congestion each of the persons on that car has lost valuable minutes of his own time and the cost of the service is increased, for the lost minutes increase the operating costs. All this might be saved if the car riders insisted, as they have the right to do, that as they constitute the large majority of citizens using the highways they should have the right to use them without being blocked to such a degree.

It has been discovered by study that there are five times as many automobiles in large cities as street cars but they carry only one-fifth as many people. Is it fair that 20 per cent of the people riding in five times as many vehicles should seriously interfere with the transportation of 80 per cent of the people?

In the past it has often been the practice to enact laws and ordinances hampering the economical and satisfactory operation of street cars. For example, on certain streets automobiles are permitted to go 20 miles an hour and ordinances forbid a street car to exceed 12 miles. The surest way for reducing costs and improving service today is for the car riders to appreciate this fact and to insist that their representatives enact laws and ordinances giving to them the right to have their street cars run without disastrous interruption by other vehicles.

Budget System Effective*

Kentucky Company Has Used This System of Control Since 1911—Management and Department Heads Enthusiastic Over Results

THE operation of the Kentucky Traction & Terminal Company is based upon the budget system of control, which has been used in connection with the various properties of this company since 1911. The budget estimates are made covering the period of a year, and are set up in detail for each month. Every officer or department head has his budget figures and his actual results at the end of each month.

The management believes that this matter of estimating future work by the organization has proved to be of great value, first in building up and bringing out the real worth of the individual department heads and sub-organizations; and second, in presenting to the board of directors statements which forecast the income and expenditures for the ensuing year. Since the budget has been followed for several years, it is possible to forecast several years in advance. Based on the total averages for the past twelve years the budgets have been within 1.1 per cent correct.

It is stated that the value of the budget as a progressive and constructive method of building up the sub-organization cannot be estimated, but it is fully realized by the department heads as well as by the board of directors. The preparation of these budgets, involving a great deal of work on the part of the organization, has been the means of uncovering many unnecessary expenditures, and the refinement in many ways of operating costs.

Based on these budget data, cash position forecasts are also worked out in detail for twelve months for the

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

ensuing three-month period, for the purposes of the board of directors. Construction budgets are similarly prepared a year in advance, as far as practicable.

Of the value of the budget General Manager J. P. Pope says that it shows monthly what has been accomplished and tends to limit unimportant expenditures. It keeps the department heads advised of the actual compared with the theoretical position of their departments. It relieves executives of unnecessary conferences over expenditures and gives an opportunity for investigation and correction of accounts that are out of line.

From the standpoint of the auditing department, the budget expedites the work of auditing by enabling the bookkeepers to check the distribution of charges made by the department heads to the various accounts. From the standpoint of the treasury department, the budget makes it possible to prepare cash position statements for a period of many months in advance with almost unbelievable accuracy, and this has resulted in savings of many dollars of interest on the floating debt.

Henry Bush, superintendent of transportation, says that the budget keeps him in close touch with the earnings and expenses of his department, and furthermore, he believes it has a tendency to create a friendly rivalry between department heads which keeps every fellow on his toes. It is also very helpful to be able to foretell approximately the amount of business to expect by divisions and the expenses of each from year to year.

W. G. Stuck, master mechanic, commented that the budget control requires that constant attention be given every detail of expenses, and that special effort be made by each department head to meet his particular estimate in order that the company estimate may not be exceeded. It is conducive to greater co-operation by all departments, looking toward the success of the company.

Company Collects from Careless Automobile Drivers

THE claim department of the Holyoke Street Railway has adopted the policy of collecting damages from automobile owners who through negligence or carelessness have caused damage by collision to the street cars. The purpose is not so much to be reimbursed for the damage suffered as the psychological effect which the court decisions have upon operators of automobiles. In the past such drivers have seemed to act as if the street car had no right to the street.

The people who use the cars are in sympathy with this policy. They know that in the final analysis they have to pay the bill, and they also realize that such a policy tends to decrease interference with traffic and therefore contributes to better service.

Salt Car Prevents Ice Formation

THE York Railways, York, Pa., operates a salt car very similar in construction to the ordinary sand car, except that it is equipped with three outlets for each rail. One outlet throws the material inside the rail; a second on the outside of the rail, and the third throws it directly on the rail. Rock salt is mixed with sand, and the mixture is dropped on the rail in the usual manner. This car has been found useful to prevent the formation of ice in the groove of the rail or in switch frogs.

The Readers' Forum

Merchants React Favorably to Traffic Suggestion

THE Elmira Water, Light & Railroad Company, Elmira, N. Y., reprinted the editorial from ELECTRIC RAILWAY JOURNAL of Nov. 10, 1923, entitled "A Basis for Getting the Merchants to Accept Traffic Regulation" and sent it to the local merchants accompanied by a letter from F. H. Hill, vice-president of the company. This editorial pointed out in the main how it is to the business interests of the downtown merchants to co-operate in making street car operation rapid by elimination of parking and other practices that contribute to congestion. The reaction of the Elmira merchants to the suggestion made is widened by four of the letters received by Mr. Hill, which follow:

"Thank you for the reprint of ELECTRIC RAILWAY JOURNAL article on traffic regulations. Personally, I believe the points made in this article are sound, but I feel that it will require much educational work to get this viewpoint over to the average merchant.

"I shall be glad to co-operate at any time in any campaign that will tend to clear up the congested condition of our downtown streets, and to speed up traffic and business."

"I have yours of the 3d with inclosure reprinted from the ELECTRIC RAILWAY JOURNAL, which I have read with interest.

"In my opinion, our parking system has been radically wrong and I am firm in my belief that no cars should be parked on Lake Street between Market and Water Streets, on Water Street between Lake and Maine Streets, nor on Main Street between Water and Grey Streets. While I realize that some retail merchants would hold up their hands and say "murder" at this suggestion, nevertheless I feel sure that if they would figure it out they would agree it is best. I feel sure if an investigation could be made, they would find that the occupants of cars parked in front of their stores often walk a block or two to purchase goods from another store. If the street were clear of cars it would give freer access to those wishing to enter the stores and also allow for a better appearance of the store.

"I have read with a very great deal of interest the clipping regarding traffic regulations which you sent me on Jan. 2, and have been thinking this problem over ever since. I agree with the writer that it is one of serious moment, and I am sorry not to have in my mind a ready-made solution for it. I am keeping this clipping and intend to take up the subject matter with some of my friends and some of the business organizations and see if we cannot stir up a little sentiment which may help in the solution of the problem."

"Thank you for yours of the 3d inclosing a copy of a letter you sent to the downtown business men.

"Personally I believe the article contains meat for real thought and much sound logic. The traffic problem is rapidly getting to be very serious and it is going to call for the united and best effort of everybody concerned to effect any relief."

Association News & Discussions

American Association Executive Committee

THE American executive committee held a regular meeting in New York on Jan. 11. The members present were President Britton I. Budd, Executive Secretary J. W. Welsh, C. L. Henry, W. H. Sawyer, F. R. Coates, R. P. Stevens, J. N. Shannahan, J. H. Hanna, R. I. Todd, H. A. Johnson, L. H. Palmer, W. H. Hyland, A. W. Brady, Edward Dana, C. E. Morgan, J. K. Punderford, W. F. Ham, E. F. Wickwire, C. S. Hawley, M. B. Lambert for H. D. Shute, A. A. Hale, J. G. Barry and C. R. Ellicott.

Secretary Welsh reported briefly for the joint committee on national relations, giving a summary of the committee's recent meeting. Mr. Budd stated that the committee assigned to consider the advisability of actively supporting the National Transportation Institute had not been able to meet as yet. Reporting for the committee on national relations, Mr. Henry said that he was endeavoring to get a postponement of the Jan. 23 hearing before the Interstate Commerce Commission on the interpretation of Section 15-A of the transportation act. He urged upon the members the very great importance of giving this matter close attention, as the question of whether electric railways are to be included under the provisions of the act, which requires that all earnings in excess of 6 per cent be returned to the commission, hinges upon the interpretation of the clause in the act to the effect that electric railways are not included under the provisions of the act unless they are part of a general transportation carrier or engaged in the general transportation of freight.

If the electric railways are included under this provision, the commerce and transportation acts are so worded that it is entirely possible that electric railways would also ultimately come under the jurisdiction of the United States Labor Board. Further details of this situation are presented in the summary of a letter about to be sent out to all member companies by Mr. Henry's committee, which is given on page 73 of this issue. Mr. Henry said that this provision of returning any excess over 6 per cent would be more serious to electric railways than to steam roads because they are not able to secure money at rates of 4 and 5½ per cent as the steam roads are. He pointed out that a few electric lines believe they are included under the act and want to be, because they are practically electrified steam roads and their principal business is in interchange of freight.

Mr. Coates reported for the committee on subjects and meetings, presenting an outline of the program for the Midyear Meeting and the speakers to be secured. This was approved by the executive committee and will be announced shortly. Mr. Lambert suggested that representatives of the motor vehicle industry be invited to attend the meeting; and as one of the subjects to be considered is traffic congestion it was thought especially appropriate that this be done.

Mr. Sawyer reported for the publicity committee and R. P. Stevens reported the additions and changes in the membership, these reports being approved.

Mr. Brady reported for the committee on relations with automotive industry organizations and said that considerable progress had been made at the meeting held early in December with a committee of the National Automobile Chamber of Commerce in establishing satisfactory relations. He said that the re-editing and revision of the annual bulletin of the chamber covering a discussion of the desirable provisions of laws regulating motor vehicle carriers had been given joint consideration and that some changes had been made which make the provisions more favorable and fair to the electric railways.

Mr. Budd proposed and the executive committee concurred in a suggestion to this committee that it give consideration to the advisability of, and to recommend some plan for, admitting bus operating companies to membership in the American Electric Railway Association. Mr. Budd said that if the electric railways are really going to take up the bus in the way that now seems to be advisable, they ought to provide some way for bus organizations to take part in the counsels of the association.

Mr. Sawyer, chairman of the committee on arrangements for the Midyear Meeting at St. Louis, March 4, reported briefly the progress of his work. He said it was planned to have no registration as it was desired that this meeting should not be just a street railway men's convention, but that it should be open to everyone. It is planned to advertise the meeting in the local papers and announce the program and invite anyone who desires to attend.

G. C. Hecker, of association headquarters, reported briefly on the recent meeting of the committees on city and interurban operation, stating that these

two committees had taken up their work enthusiastically and that there was every prospect for fruitful work.

Mr. Johnson, president of the Engineering Association, requested for the use of the heavy traction committee an appropriation of not to exceed \$500 for the purpose of revising and bringing up to date and putting in a readily usable form the bibliography of the various phases of electrification work.

E. F. Wickwire said that in connection with the work of the committee on co-operation with manufacturers, F. C. J. Dell had personally called upon fifty-three manufacturers in and around New York for the purpose of enlisting their more active interest and support. He said that this field work seemed to be highly appreciated and would no doubt promote greater interest in the association. Mr. Dell is to visit the manufacturers in other territories.

The executive committee authorized the appointment of a committee on date and location of the 1924 annual convention and exhibit.

Edward Dana, chairman of the committee on education, requested an appropriation of \$5,000 to be used in the work of preparing a course on the fundamental economics of the street railway, for use of the rank and file of railway employees. This was not granted as it was suggested that such appropriations should come from the individual railway members instead of the association. It was suggested that the time has come when the several associations which are working toward the inauguration of courses in public utility economics in the universities should consolidate and co-ordinate their efforts. Mr. Dana was authorized to proceed in this direction.

G. T. Hellmuth, on behalf of President Hyland of the Claims Association, requested authority and an appropriation for the Claims Association to engage a safety engineer with the idea of providing a continuing management of this association and to secure the use by railway companies of the very valuable information developed by the association. It was estimated that this would cost from \$5,000 to \$6,000 a year, exclusive of traveling expenses. The matter was referred to the policy and finance committees.

A suggestion that the association subscribe for issues of public utility reports for its member companies who do not now subscribe, to the extent of \$2,500, was laid over to the second succeeding meeting and the matter meantime referred to the finance committee.

The next meeting of the executive committee will be held at St. Louis on March 3.

Interurbans Should Indicate Status

AT THE MEETING of the committee on national relations, held in New York on Jan. 10, Chairman Charles L. Henry spoke of the importance of the recent decision of the Supreme Court on all railroads included under Section 15a of the transportation act of 1920, and the need that all electric roads define their status as to whether they are "engaged in the general transportation of freight" and so come under the act. A hearing has been scheduled by the Interstate Commerce Commission for Jan. 23 to determine what electric roads are subject to the jurisdiction of the commission under Section 15a. All roads so included are limited, along with the steam railroads, to 6 per cent direct return on a fair valuation, and any excess is subject to the recapture clause as set forth in the act.

To apprise electric railways of the situation, the committee, with the approval of the executive committee, decided to mail to all interurban railways a circular letter urging them to advise the committee of their position. This letter, signed by Mr. Henry as chairman of the committee, says, in part:

"A hearing before the Interstate Commerce Commission is to be held on Jan. 23 to determine what electric railroads of the United States are subject to the jurisdiction of the Interstate Commerce Commission under Section 15a. If your road is subject to Section 15a, your earnings are limited along with the steam railroads to 6 per cent on a fair valuation, and any excess is subject to the recapture clause as set out under said section.

"There are other matters of importance included in the provisions of Section 15a, but the particular language of that section, which controls your inclusion or exclusion under the section, is whether or not your road is operated as a part of a general steam railroad system of transportation or engaged in the general transportation of freight."

"It is necessary that you determine what your status is under this section and be prepared, if the subject is important to you, to attend the hearing before the Interstate Commerce Commission in Washington on Jan. 23. Your committee believes that the majority of electric interurban railways are 'not engaged in the general transportation of freight' in such a manner as to bring the roads under the jurisdiction of Section 15a. There are some roads that must be included.

"A personal appearance, we understand, is necessary at the Interstate Commerce Commission's hearing if the road desires to be heard. We suggest that you prepare your case from your viewpoint, send a copy of it to this committee, addressed to 949 Munsey Building, Washington, D. C., and we will go over the case for you and be prepared to discuss it with you at any time from Jan. 21 up to the time of the hearing on Jan. 23.

"So that you may know in a general way the committee's views on this subject, we append hereto a copy of a letter which was sent to the Interstate Commerce Commission under date of Jan. 24, 1923.

"It is important that the committee be informed at once of your position. Please, therefore, wire immediately upon receipt of this to James W. Welsh, executive secretary, at association headquarters, 8 West Fortieth Street, New York City, whether your company opposes or consents to coming under Section 15a. Let us have this telegram without fail."

(APPENDED LETTER)

Jan 24, 1923.

To the Interstate Commerce Commission Gentlemen:

The Chicago, North Shore & Milwaukee Railroad has today filed with your honorable body its brief and argument, as an interurban railway, on Section 15a of the interstate commerce act, and particularly with reference to the language "engaged in the general transportation of freight."

The American Electric Railway Association, acting in behalf of its members, asks leave to intervene in the record of this case, and make the following observations:

1. To a large class of our members, the construction placed by the commission on the words "engaged in the general transportation of freight," if given a broad general application, will be vitally important.

2. It may be accepted as fact that a large number of interurban railroads are the handlers of freight business to a greater or lesser extent, and that there are a few interurban lines which believe themselves to be "engaged in the general transportation of freight," while the vast majority, such as the North Shore Line, consider themselves as entirely outside of the application of the quoted language.

3. If it be the commission's purpose to determine the broad, general question, in reviewing the North Shore Line's case, which is being filed today, and therefrom adopt such construction of the above-quoted language and issue such orders as will be determinative in most other interurban cases—then the American Electric Railway Association respectfully requests that the general subject of construction of the language "engaged in the general transportation of freight" be docketed for formal hearing, and we will be prepared at such hearing to go into every phase of interurban line operation, to furnish the ground-work for a general interpretation and construction of the meaning of such language. In other words, we respectfully suggest that a determination of the imminent case in such a manner as to bind the whole interurban railroad industry, without giving such industry a fair hearing, would not only be unjust but also.

4. In connection with the North Shore Line case directly, it may be remarked that from their record of physical operation and the absence of through routes and joint rates and interline billing arrangements, the most liberal effort to bring such line within the quoted language could only result in a finding that they are "engaged in the restricted transportation of freight," or "engaged in the transportation of freight in a limited way." If Congress had intended such roads to be included under your jurisdiction in Section 15a, then they would have written the law "engaged in a restricted or limited transportation of freight" or omitted the word "general" therein. But Congress put it on the statute books "engaged in the general transportation of freight," and obviously any interurban line not performing wholly and completely in the freight business in the same manner as a steam railroad conducts such business cannot, by strained construction, be put in a class with roads which are, in the universally accepted sense, "engaged in the general (not restricted or limited) transportation of freight."

5. Just one more thought directly in connection with this North Shore Line brief and argument: Congress did not make the quoted language read "engaged in the transportation of general freight." An interurban road might be handling freight of all classes of "general freight" if you please, and still be restricted or limited in the methods of handling or to a small part of its line, in such a manner as to be entirely out of the language as used in Sec-

tion 15a—"engaged in the general transportation of freight."

In other words, we lay down the two broad general propositions, viz.:

(a) that a restricted or limited transportation of freight; and

(b) that the transportation of general freight—neither of the two bring an interurban road within the class of such lines as are "engaged in the general transportation of freight," and ipso facto within your jurisdiction in the matter of excess earnings.

6. This committee has, on several occasions in the past, asserted its desire to be helpful to your honorable body in your problems connected with the electric railway industry. We wish to restate that desire again at this time. If we can be of any service to you in any way we hope you will command us.

By order of the committee:

(Signed) CHARLES L. HENRY, Chairman.

Midyear Committee

THE third meeting of the committee on arrangements for the Midyear Meeting was held in St. Louis on Jan. 4, with Chairman W. H. Sawyer and the following members present: B. W. Frauenthal, B. W. Stemmerich, F. H. Richards, C. E. Allen (for M. B. Lambert), Col. A. T. Perkins, E. D. Payne (for E. P. Waller), F. O. Grayson, F. H. Rein, F. V. Cook, Col. H. D. McBride, J. B. Sheriden, C. O. Birney.

Reports were heard from the various sub-committees. It was announced that Mrs. A. T. Perkins had accepted the chairmanship of the ladies' entertainment committee. It is planned to have only local women serve on this committee with Mrs. Perkins.

The sub-committee on seating is busy making a drawing of table location and seating plan. It is tentatively to be laid out on the basis of a head table seating twenty-four, and all other tables to be round tables seating ten each.

It was planned that every member of the committee on general arrangements should be a member of the transportation committee and directly responsible for seeing to it that all members in his district receive the necessary transportation, data and attend the meeting. There is some prospect of securing a round-trip ticket for fare and one-half.

The committee is planning to get out a general folder discussing the Midyear Meeting from all angles. An interesting part of the arrangement is that the dinner speeches are to be broadcasted through the St. Louis Post Dispatch station and possibly other stations.

E. D. Payne was made chairman of the dinner entertainment committee. It is planned to make arrangements for dancing at the Hotel Chase after the dinner.

The committee agreed that no cancellation of dinner tickets would be accepted after Feb. 29.

Bus Operation

PLANS for the coming year's work were laid out by the committee on bus operation, of the Transportation & Traffic Association at a meeting held on Jan. 8 in New York. It was

decided to continue the study made last year, which resulted in the report which was presented at the Atlantic City Convention.

Sub-committees were appointed to study the various parts of the subject. Chairman Flickinger will be responsible for the analysis income statements and of the general features of operation. Messrs. Scanlon and Stewart will scrutinize the various types of operating methods, and Mr. Arnold will study maintenance practice as developed by the committee work. Messrs. Fritch and Keenan will make a study of bus operating rules.

Present at the meeting were W. J. Flickinger, chairman; Bert W. Arnold, H. F. Fritch, J. B. Stewart and V. E. Keenan of the committee and J. W. Welsh and G. C. Hecker of association headquarters.

Buildings and Structures

THE first meeting of the buildings and structures committee of the Engineering Association was held in New York on Jan. 7. Those present were N. E. Drexler, chairman; C. H. Clark, L. R. McKay, J. D. Kent, H. R. Stamm, Judson Zimmer and G. C. Hecker of association headquarters.

The chairman announced the appointment of Mr. McKay as vice-chairman and the personnel of the sub-committees, the subjects being 1a, Passenger Terminals, J. D. Kent, chairman; 1b, Freight Terminals for City and Interurban Lines, E. D. Eckroad, chairman; 1c, Combination Terminals, J. R. McKay, chairman; 2, Design of Building for Proper Storage and Maintenance of Buses, H. R. Stamm, chairman; 3, Review of Existing Standards, B. R. Brown, chairman.

It was decided to work along the following lines:

On the subject of passenger terminals the sub-committee is to get data on the Dixie Terminal and any other recent ones and work up a plan for a typical layout.

On freight terminals the sub-committee is to investigate the Detroit United layout, including the freight container plan; also the joint freight arrangement at Indianapolis. A questionnaire is to be prepared by the sub-committee to be sent to representative companies to obtain data on freight terminals to be used in connection with preparing a typical layout.

The combination terminals sub-committee is to go over plans obtained last year and any others which are now available with a view of making up a typical layout.

The sub-committee on bus garages prepared a questionnaire which will be sent to railway companies operating buses. Points of particular importance that were brought out in discussion were the necessity of proper ventilation to take care of carbon monoxide gas, plenty of clear height, facilities for storage and handling of gasoline and oils, use of hoists rather than pits and general sanitary conditions.

It was decided to hold the next meeting in Cincinnati the latter part of March.

Unification of Car Design

THE new committee on unification of car design held its first meeting in New York on Jan. 8. Chairman H. H. Adams called the attention of the members to his letter outlining some fundamental car dimensions which should be considered in connection with the work of unification of design. The members present were: J. Lindall, G. L. Kippenberger, V. Willoughby, C. Gordon and J. W. Hulme.

Tabulations prepared in advance of the meeting were carefully discussed to determine the extent to which the dimensions of recent cars varied from those recommended by the 1922 committee. In order to obtain a proper starting basis for its work, the committee was generally agreed that those parts of the body which are most frequently replaced or repaired should be considered first. From this standpoint, therefore, it was decided to start with the size of the glass in the lower side sash and gradually build up uniform dimensions for other parts so as to fit as nearly as possible into the general dimensions adopted by the 1922 committee.

It was decided to limit the work this year very largely to the establishment of dimensions for glass, sash and side-post centers on city cars. It was considered important to study these basic dimensions thoroughly in order to command co-operation in adhering to them. This, it was felt, would lay a secure groundwork for a unification program.

After considerable discussion as to the most practicable method for fixing these fundamental dimensions it was decided to obtain from the car builders such data as would permit a comparison of all double-truck city surface cars built in 1923. It was further decided to send a tabulation containing this information to each railway property having new cars represented, with a request that it indicate the reasons for variations in the dimensions of its new cars from those recommended by the 1922 report.

To create additional interest and stimulate discussion at the annual convention, it was decided to prepare full-size models of car side framing with different types of sash and post construction, so as to illustrate the possibilities of the proposed uniform dimensions.

A discussion ensued of the savings which would result from greater uniformity in the design of many miscellaneous parts used in car body construction. Mr. Gordon was delegated to prepare a tentative draft of this subject for insertion in the annual report of the committee. Mr. Willoughby suggested that the co-operation of the storekeepers be obtained in order to determine just what savings in stocks of repair parts might be accomplished by the program proposed.

Executive Committee Claims Association

A MEETING of the executive committee of the Claims Association was held at association headquarters in New York on Jan. 10. Those in attendance were President W. H. Hyland, Gloversville; First Vice-President H. D. Briggs, Newark, N. J.; J. S. Kubu, Cleveland; G. T. Hellmuth, Chicago; H. O. Allison, New Brighton, Pa., and E. L. Lindemuth, Wilkes-Barre, Pa.

The committee discussed the recommendation made at the last convention of the appointment of a safety engineer to encourage and to co-operate with companies in electric railway safety work. The work of the various committees of the association was also considered, namely, the committees on accident prevention, claims department aspects of motor bus operation, employment, medical and surgical work, resolutions, subjects, and a uniform grade crossing law.

The executive committee learned with regret of the death of former President Cecil G. Rice, Pittsburgh, and a committee was appointed to draft suitable resolutions.

News of Other Associations

Tentative Program for Mid-West Meeting

HEADQUARTERS for the Springfield, Mo., meeting of the Mid-West Electric Railway Association, Jan. 17, will be the Colonial Hotel. The morning and afternoon business sessions, as well as the banquet that evening, will be held there.

The tentative program includes the following papers:

"Electric Railway Freight Traffic," by W. A. Clough, railway engineer General Electric Company, Chicago.

"Bus Operation and Regulation," by F. S. Welty, assistant general manager Omaha & Council Bluffs Street Railway.

"Shop Practice and Maintenance," by John S. Dean, railway engineer Westinghouse Electric & Manufacturing Company, East Pittsburgh.

"One-Man, Two-Man Cars and Train Operation," by D. L. Fennell, superintendent of transportation Kansas City Railways.

A luncheon will be given the members at the new power house of the Springfield Traction Company. From 4:30 to 6:30 an informal reception will be held.

At the evening banquet the following will be the addresses:

Address, Hon. John S. Farrington, Judge, Court of Appeals, Springfield, Mo.

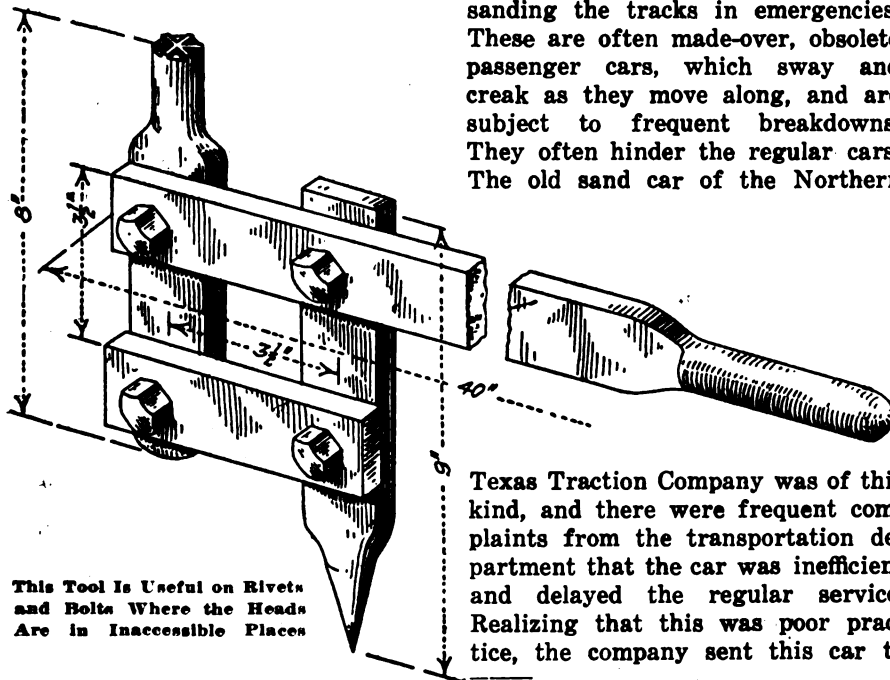
"Public Utility Operation as Viewed by a Newspaper Man," by E. E. E. McJimsey, editor and manager Springfield *Republican*.

"Twenty-five Years Experience with Transportation Problems," by E. V. Williams.

Maintenance of Equipment

"Holder On" for Truck Work

A HANDY tool has been developed at the shops of the Metropolitan West Side Elevated Railway, Chicago, for "holding on" to the head of a countersunk bolt to prevent it from turning when the nut is removed, and also for use as a "bucking" bar when riveting. The tool is especially efficient for holding bolts or rivets in narrow places, such as on the inside of a truck where the bolster swings. In the past, it was often necessary to cut off a bolt or its nut in order to remove it from



the frame of the truck. This difficulty has largely been overcome by the use of the new tool.

The tool is really an expanding "holder on" operated by a long lever, using some convenient adjacent portion of the truck as a brace. It is constructed of 3-in. x 1 1/2-in. steel bar in the form of a pantograph. One side is upset to 1 in. diameter so as to press against the bolt or rivet head. Serrations are formed on the end of the bar to prevent the bolt from turning. The parallel bar is also upset to form a point on the opposite side from the serrated end. One side is extended to form a handle 40 in. long, giving a leverage of approximately 10 to 1. Four 1-in.

bolts hold the four sides together and permit free motion.

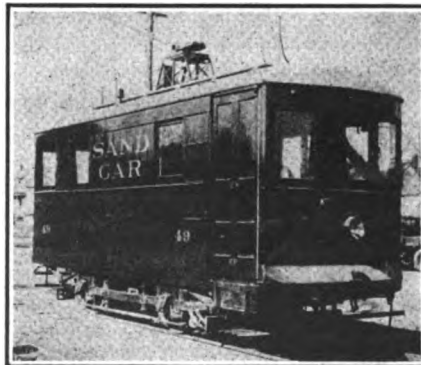
In use, the serrated end is placed against the head of the rivet or bolt, and the pointed end placed against an adjacent portion of the truck. The handle is moved toward the pointed end, thus applying pressure to the head of the bolt or rivet.

Making the Sand Car Reliable*

NEARLY all street railways, even though their regular cars may be equipped with sanders, have service cars especially equipped for sanding the tracks in emergencies. These are often made-over, obsolete passenger cars, which sway and creak as they move along, and are subject to frequent breakdowns. They often hinder the regular cars. The old sand car of the Northern

Texas Traction Company was of this kind, and there were frequent complaints from the transportation department that the car was inefficient and delayed the regular service. Realizing that this was poor practice, the company sent this car to

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.



The Rebuilt Car Can Operate at the Same Speed as Passenger Cars

the shop and rebuilt it from the ground up.

The G.E. 54 motors and the truck were thoroughly overhauled. In the reconstruction safety car control equipment was added and air brakes substituted for the old hand brakes. A Westinghouse M-28 brake valve with sanding features is used to operate the traps. The car door is manually operated rather than being pneumatic as on safety cars, because at times it is desirable to run the car with the door open. The air compressor, Westinghouse D-2, is inside the car body, as are also the air reservoirs. The compressor intake is on the roof, so that sand dust will not be taken into the compressor. The sand bins have a capacity of 3 cu.yd. Because of the method of reconstruction, the car now has somewhat the appearance of a Birney car, although in reality it is not.

Equipped in this way the sand car can operate on lines with safety cars without interfering with the regular service. The railway is pleased with the operation of the rebuilt car and the public also is pleased, because it can see that the desire of the company is to do everything possible to avoid accidents on account of slippery rails.

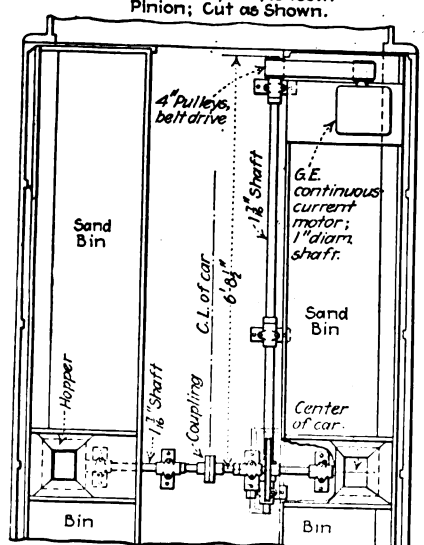
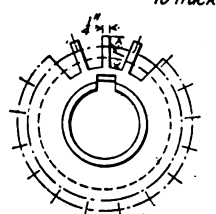
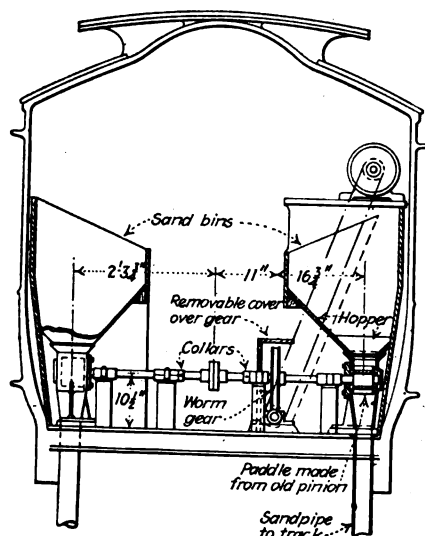
Special Tamping of Steel Ties

A SPECIAL method of insuring a bearing under the plates of steel ties was pictured and described in this paper, page 1005, issue of Dec. 15, 1923, as worked out by the Cleveland Railway. This consisted of having a space under the plates when pouring the concrete base, later filling in the space with a 1:3 slag screenings and cement mix and thoroughly tamping. Charles H. Clark, engineer maintenance of way, has now extended the experiment.

One 100-ft. stretch of track has been built, using creosoted sawdust instead of the slag and cement for tamping in under the tie plate. This material is said to compact like a board and to provide some resiliency. Another 200-ft. stretch has been tamped in under the tie plate with rock asphalt.

Motor-Driven Sand Box in Holyoke

ON ITS sand cars the Holyoke Street Railway is using a motor-driven sand box of the kind illustrated in the drawing below. It consists, briefly, of a $1\frac{1}{2}$ -hp., 550-volt motor, which is mounted on top of one end of the sand bin and is belted to a shaft connected by worm gear with a shaft at right angles to the car. On each end of the latter shaft is a pinion which acts as an agitator for the sand in the hopper. This pinion is made up from a GE-67 fifteen-tooth pinion, but the teeth are cut out somewhat in the form of paddles, as shown, so that it will act



Sand Cars in Holyoke Use Electric Drive for Distributing Sand

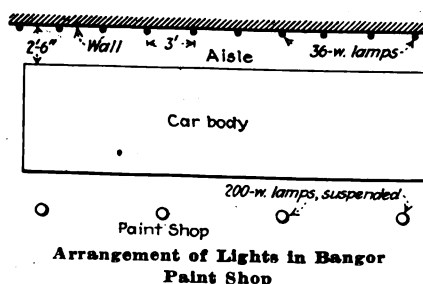
more effectively as an agitator than in its original form.

The shaft at right angles to the center line of the car is in two parts, connected by collars, so as to make its installation in and removal from the car more easy.

The use of a motor drive instead of axle drive has been found to have several advantages. One of these is that it is possible easily to stop the mechanism, and so the distribution of sand, when the car is passing over switches or any other part of the track where sand may not be desirable or needed. Another advantage of the motor drive is that it is possible to increase or decrease the rate of sanding without changing the speed of the car.

Improving Paint Shop Lighting at Bangor

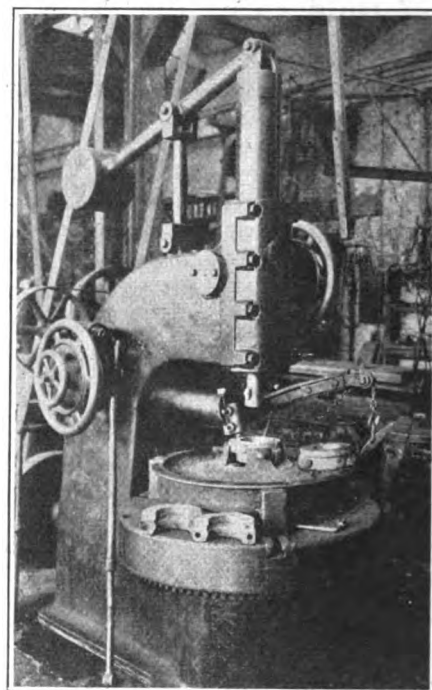
WITH an outlay of less than \$50 the illumination of the paint shop of the Bangor Railway & Electric Company, Bangor, Me., was much improved by providing a circuit of ten 36-watt lamps spaced 36 in. apart horizontally on the wall side of the painting track to increase the intensity at the surface of the car body paneling. The lamps were hung in conduit fittings carried by a $\frac{1}{2}$ -in. section of rigid conduit attached to the wall at a height of 43 in. above the floor, all being operated in multiple on a 110-volt circuit and controlled by a snap switch convenient to the painters' working area. The aisle width between the



car body and the wall is 30 in., and the wall further aids in the reflection of light by the use of enamel paint. On the opposite side of the car body illumination is provided by four 200-watt gas-filled lamps suspended from the roof structure with counterbalances, enabling these to be used at varying heights. The arrangement as a whole does away with the use of portable lamps and loose cords in the vicinity of the car body and painting aisles. H. B. Baldwin is superintendent of shops.

Boring Mill Reduces Time for Finishing Axle Collars

A WHEEL boring machine is used for finishing and boring axle collars instead of a lathe in the shops of the Spokane United Railways, Spokane, Wash. The collars



Machining Axle Collars in a Boring Mill

are cast in halves, and the edges of the halves are not machined but are simply bolted together with a piece of sheet fiber between them. They are then set up in a jig which is made of a discarded steel wheel as shown in the accompanying illustration.

The hub of the wheel is cut out and three set screws are provided for holding the collar in place. They are then faced off and bored in the boring mill. The operation requires an average of four minutes per collar, and this method reduces by one-half the labor cost as compared with the work if done with a lathe.

Joint Welding in El Paso

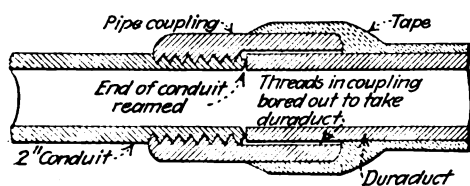
ALL joints in paved tracks are now being welded by the El Paso Electric Railway. This company has lately gone over to the standard angle bar, instead of the special joint previously used. In building new track four or five rails are joined and bolted and strung out alongside the excavation. They are turned bottom up and then on each side, and the angle bars are seam-welded to the rails at top and bottom, the nuts being spot-welded to the bolts. A

very strong joint results. So far not a single failure has been recorded, although several hundred joints are in service.

Simple Joint Between Conduit and Loom

WHEN control cables are run in loom under the car floor, it is necessary to protect them from mechanical injury where they run under trap-door openings.

The Chicago Surface Lines has used short lengths of aluminum conduit for this purpose, which necessitated some form of joint between the



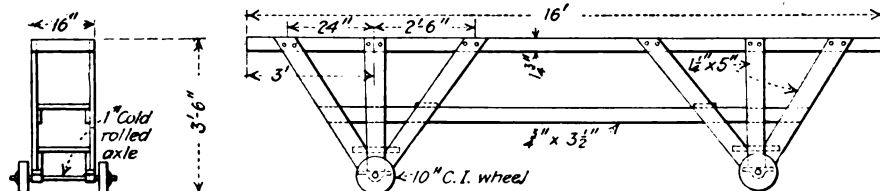
A Bored Out Pipe Coupling Is Used to Make Joint Between Loom and Conduit

ends of the conduit and the loom. The simple arrangement shown in the accompanying drawing was adopted, and is applicable whenever a joint between loom and conduit is required.

An ordinary pipe coupling is bored out for one-half of its length so as to allow the end of the loom to be pushed in with a snug fit. As both loom and conduit are securely fastened to the car floor there is no strain at the joint. A layer of tape is applied to the outside to make the connection weathertight.

Substantial Movable Painter's Scaffold

THE type of portable painter's scaffold shown in the accompanying sketch is used in the West Shops of the Chicago Surface Lines. With this arrangement the scaffold can be readily moved from car to car, and at the same time it provides a substantial structure which greatly reduces the possibility of accidents such as frequently occur when the ordinary plank and horse arrangement is used.



Design of Movable Painter's Scaffold Used in Chicago

Rack for Coupling Pins

TRouble has been experienced in Spokane, Wash., from the loss on cars of coupling pins that are used infrequently. To eliminate the cost resulting from this loss and avoid delays when a pin is required in emergency, a wood block with holes for two pins has been provided to keep them in proper place. This block, together with two drawbar

pins, is installed in the front-end vestibule of each car.

This holder is conveniently located in view of the conductor, whose duty it is to see that there are pins in the holder before the car is taken out. Previous to the use of this block, coupler pins were chained to the drawbar, but for some unaccountable reason they seem to disappear. This particular improvement was the suggestion of one of the car repair men.

New Equipment Available

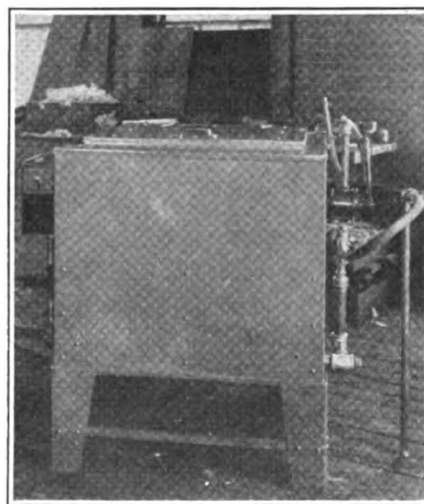
Machine for Oiling Waste

A MACHINE for the saturation of waste with oil to prepare it for use in journals, manufactured by Wyckoff, Inc., Joliet, Ill., has recently been installed in the Wilson Avenue shops of the Chicago Elevated Railroad. It is capable of saturating 240 lb. of waste every twenty-four hours with a content of 2 lb. of oil for each pound of dry waste used. It is stated that the saturation obtained is very uniform.

The outer containing tank shown in the illustration, which is insulated with asbestos, serves as a protection to the inner tank and contains electric heating coils, a heat-controlling device, the oil supply pump and the necessary piping. Openings are provided directly under the heating elements to admit sufficient air for circulation.

The lower portion of the inner tank is a reservoir for the oil, with a pipe connection to the pump through the bottom. Placed in the tank directly above the reservoir are three waste containers, which are made especially long and narrow to allow the heat to pass up and through the waste, insuring a dry condition before applying the oil. These containers are made of galvanized steel and wire cloth, and are hung from the upper edge of the tank. The thermostat by means of which the heating coils are controlled to give an even temperature is also placed in this chamber.

In operation the waste is placed in the containers and the heat is turned on. The waste is then allowed to dry for approximately one hour. At the end of this time the cover is raised and the oil pump started. Oil is sprayed over the waste by means of a hand hose until the containers are completely flooded. The cover is then closed and heat



This Waste Saturating Machine Has Electric Heat Thermostatically Controlled

is applied for approximately four hours. With the thermostatic control there is no chance of overheating the oil.

An auxiliary intake pipe is connected to the tank, so that to replenish the supply of oil a three-way valve may be opened and the new oil pumped in by means of the oil supply pump.

The tanks are made of No. 1 gage welded annealed steel. The oil storage capacity of the inner supply tank is 65 gal. The three waste containers will hold a total of 20 lb. of dry waste, or 60 lb. of saturated waste having a ratio of 2 lb. of oil to each pound of dry waste.

The News of the Industry

Statement Awaited

Cincinnati Traction and Street Railway Companies Will Report on Settlement—Merger Negotiations

Assurance was given the street railway committee of the City Council of Cincinnati, Ohio, at its meeting on Jan. 4, that the Cincinnati Traction Company and the Cincinnati Street Railway would be in a position within the next fortnight to make a statement as to whether they can reach an agreement for the settlement of Cincinnati's traction problem. The purpose of the meeting was to consider the report of Mayor George P. Carrel's traction committee, presented on Dec. 24. The report recommended the merging of the interests of the Cincinnati Street Railway and the Cincinnati Traction Company, with a reduction of the combined capital stock from \$39,000,000 to \$25,000,000, together with other suggestions that would, in the opinion of the committee, result in a lower fare and better service.

CONCLUSION PROBABLE SOON

Robert A. Taft and Samuel Assur, attorneys, represented the Cincinnati Street Railway and Walter A. Draper, vice-president of the Cincinnati Traction Company, represented his corporation. Mr. Draper said his company concurred in the fact contained in Mr. Taft's statement that the two companies were negotiating in the hopes of reaching an amicable settlement. He explained, however, that while his company might prefer some other method for reaching a settlement, nevertheless it was proceeding along the lines suggested by the street railway company.

When asked how long he thought it would take the companies to reach a conclusion as to whether they can come to an agreement, Mr. Taft replied that he felt certain within the next fifteen days. In this connection Mr. Taft also said that his company was preparing a report of operations for 1923 which would serve as a basis for figuring the earning capacity of the operating company. The street railway company in 1901 leased the Cincinnati electric railway system to the traction company for a period of forty-five years. Mr. Draper said that the report of his company would be ready in ten days, so the companies could resume their negotiations and make a definite statement to the Council in fifteen days. The Council committee then passed a resolution postponing the hearing until Jan. 21.

Attorney Taft submitted a statement on behalf of the committee of the Cin-

cinnati Street Railway. He said that the representatives of the Cincinnati Street Railway had carefully studied the report of the special committee and that while they were not in accord with all the conclusions and recommendations made by the committee, they agreed that a serious crisis existed in the traction situation in Cincinnati, and that they were anxious to do their part in meeting it.

The statement called attention to certain fundamental facts in the problem. The Cincinnati Street Railway, with some 5,000 stockholders, mostly residents of the city of Cincinnati, was the owner of the tracks, poles, wires, cars and other street railway property in Cincinnati. The property had been leased with the knowledge of the city of Cincinnati to the Cincinnati Traction Company, and under that lease and the service-at-cost ordinance, the Cincinnati Street Railway was not the operating company and had no control whatever over the operation of the street cars, the fares charged or the increase of capital, so long as the traction company paid the rent and complied with the provisions of the lease. But because of the obligations entailed in its franchise, and the desire to assist in a solution of the present unsatisfactory situation, the statement went on to say that the directors of the Cincinnati Street Railway would be willing to recommend to the stockholders that it purchase the leasehold interest of the Cincinnati Traction Company and itself undertake the operation of the property, provided the purchase could be made on such terms as to permit the rendering of service to the public and the earning of a reasonable return on employed capital.

CORPORATE STRUCTURE WOULD BE SIMPLIFIED

The result would mean the elimination of all but one company from the situation, the making possible a more economical operation, the giving of better service to the public and the construction of necessary additions and betterments to the system. The statement said that one thing was clear, namely, that if any improvement in the situation was to be made, the price paid must not be more than the fair value of the leasehold interest. Further, it must permit a reasonable fare to the car-riding public and it must permit repairs to be made to the entire property. Otherwise the very purpose of the purchase which the company asked to be made would fail of its accomplishment and neither the public nor the street railway would in any way be benefited thereby.

Transit Departure Suggested

Extension of New York City Rapid Transit Lines to New Jersey Discussed

As part of the New York Transit Commission's program to develop special facilities for the tremendous suburban traffic into New York City, Commissioner Harkness has had a number of informal discussions with D. A. Garber and his associates on the North Jersey Rapid Transit Commission, followed by one joint conference, also informal, of the two commissions.

In the discussions with Mr. Garber and his associates the suggestion has been made and considered that a long step in the direction of caring for the New Jersey traffic could be made if the present undeveloped capacity of the local tracks of the Interborough Subway were utilized. These tracks now terminate on the East Side Line at City Hall Park and on the West Side Line at South Ferry. The movement on them is generally one way, workward in the morning and homeward in the evening.

PLAN A LOGICAL ONE

With these facts in mind, it has been suggested that if the North Jersey Rapid Transit Commission should construct a loop system well back of the waterfront on the New Jersey side, with tunnel connections to Manhattan and the present local track terminals of Interborough lines, the Interborough service could be extended through these tunnels and the loop. By means of the loop the various trunk lines reaching the Jersey waterfront, whose terminals are now so badly congested, could deliver their commuting traffic at convenient interchange stations with ample facilities and the passengers would then be carried directly into Manhattan and into the parts of New York's transit system where they can be taken care of with the least interference with city traffic.

Mr. Harkness says that at the time of these discussions, and with the present lack of expert engineering advice at the command of the North Jersey Rapid Transit Commission, it has only been possible to give such suggestion a superficial examination, but that the suggestion does seem to offer possibilities that make it worthy of careful study. Even though the plan should prove feasible from engineering and operating standpoints, there are many legal and financial obstacles which would have to be overcome, but Mr. Harkness says that so far it does not appear that any such obstacles would be insurmountable. Such service would

necessarily have to be predicated upon a substantial return to the operating company and indirectly, therefore, through the company, to the city of New York. In the discussions with Mr. Garber and his associates the point has clearly been made that the suggestion must be considered absolutely as a business proposition in which the balances of advantage must be carefully considered.

In the discussions with the members of the North Jersey Rapid Transit Commission it was also made clear that the New York Transit Commission could not commit itself as to the adoption of such a plan either by it or by the local authorities of the city. The members of the commission did, however, state that the plan seems to offer possibilities that make it worthy of careful and thorough study.

SUGGESTIONS MADE TO LEGISLATURE

As a step to this end the connection of the existing rapid transit lines in New York City with the transportation system in Northern New Jersey by tunnels under the Hudson River was suggested on Jan. 8 by the North Jersey Rapid Transit Commission in a report to the New Jersey Legislature. The commission declared that this seemed the best method of relieving the present congestion in New Jersey suburban traffic and of preventing a congestion that might become intolerable. The report of the North Jersey Commission approved in its entirety the suggestion made by the Transit Commission of New York City. On the other hand, residents of Staten Island, New York City, are unalterably opposed to any extension of New York City lines out of the state while they are inadequately served.

In a letter to the New Jersey Chamber of Commerce, J. J. Mantell, operating vice-president of the Erie Railroad, states that company is willing to turn over its purely passenger lines to a rapid transit company to facilitate railway operation or to co-operate with the rapid transit company in the construction of a union station at Croxton yards, where passengers could be discharged from the trains and distributed by existing and proposed electric systems under the river.

Provision Made for Pension Plan for Interstate Employees

A service annuity plan that will provide pensions for employees retired on reaching certain ages has been put into effect by the Interstate Public Service Company, Indianapolis, operating the Indianapolis & Louisville traction line. The company now has about 1,145 employees in the 104 cities which it serves with light, power and railway service.

The company will make an annual contribution to finance the plan. Administration will be in charge of five persons, three to be appointed among the officers or employees, and the other two to be selected by the employees by direct ballot.

Co-operate for National Christmas

The electric railway companies in Washington co-operated with the electrical industry in giving the country its first national Christmas tree. In addition to helping in other ways, signs telling of the lighted tree were carried on the front of cars. Here is the way the Capital Traction Company sign read:

60-FT. XMAS TREE
2,500 Lamps Evenings
DEC. 24—JAN. 1
White House Ellipse

President Coolidge threw the switch which lighted the tree on Christmas eve. The idea of a national Christmas tree originated with and was carried through by the Society for Electrical Development.

Cincinnati Planning Commission Has Extensive Plans Under Consideration

Revised plans for the extension of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad from the present terminus at Anderson's Ferry to the central section of Cincinnati, Ohio, have been submitted to the City Planning Commission for approval. The route was changed to conform with the proposed freight and passenger terminals to be built by railroads entering Cincinnati.

The route will remain the same from Anderson's Ferry to Evans Street, as contemplated in the plans submitted to the Council a year ago. That is, the line will follow the "Big Four" Railroad's right-of-way from Anderson's Ferry to Evans Street. At Evans Street it will become an elevated structure, extending south over the Baltimore & Ohio Railroad to Second Street and thence along Second Street, from a point at approximately Mill Street, to Vine Street, thence north to Third Street.

The old plan provided a right-of-way from Evans Street over Sixth Street, Front Street and Third Street to Vine Street. Stanley Shaffer, receiver for the interurban company, said that the purpose of filing the revised plans was to indicate to the engineers of the Planning Commission that the proposed route will not interfere with the development of the freight and passenger terminals contemplated by the railroads.

As soon as the plans have been approved by the commission, Mr. Shaffer will seek consent of the City Council for a change in the right-of-way proposed in the original ordinance, which has been pending in the Council several months. It was indicated that as soon as the necessary consent has been obtained an effort will be made to interest capital in the proposed extension.

The railway operates from Anderson's Ferry to Aurora, Ind. Under the

receiver the property has been greatly improved and the road is now meeting its operating costs.

More Indictments in Connection with Buffalo Dynamiting

John M. Parker, president of the Buffalo local of the Amalgamated, Clarence F. Conroy, business agent of the Buffalo union of the Amalgamated, and three other striking platform employees of the International Railway were indicted by the special January Federal Grand Jury on charges of conspiracy in connection with the dynamiting of the Buffalo-Niagara Falls train on Aug. 17, 1922, during the strike.

The indictment of Parker, Conroy and Martin McDonough, W. H. Smith and William L. Blandell resulted when new evidence in connection with the dynamiting outrage was presented to the Federal Grand Jury by William J. Donovan, United States attorney for the Western district of New York. It is reported that at least twenty-five others will be involved in the dynamiting conspiracy charges. Fourteen members of the union, including Robert C. Lacey, Buffalo, State Senator, were indicted about a year ago.

When they were arraigned before United States District Judge John R. Hazel all the prisoners entered pleas of not guilty.

The trial of those alleged to be involved in the dynamiting outrages during the strike is docketed to open in United States Court on Jan. 15. Federal District Judge George S. Morris of New Hampshire will preside at the trials.

The specific charge in the indictments against the union officers and members is conspiracy to violate Sec. 1 of the Sherman anti-trust law in that they are alleged to have planned forcefully to restrict interstate commerce. More than forty passengers were injured in the wreck which followed the dynamiting.

The government and private detectives for the International have been working on the case for almost two years. Rewards totaling \$100,000 have been offered by the International Railway for information leading to the arrest and conviction of those responsible for the dynamiting outrages during the strike of 1922.

So far as the Amalgamated is concerned the strike of platform employees on the local and interurban divisions of the International is still in effect. The company declared an open shop, broke off all contact with the union and has been operating cars under the Mitten co-operative plan for two years with a great deal of success.

Incidentally the alleged connection of State Senator Lacey with the Buffalo dynamiting may have an important effect on the Democratic legislative program. From Albany comes the statement that should Mr. Lacey's presence be lost there in connection with the progress of the Buffalo case it would

mean the loss to the Democrats of the majority of one they now have in the Senate and would block the administration's program in the upper house unless a special election were called and a Democrat elected in his place.

Negro Appointed Member of Illinois Commerce Commission

Edward H. Wright of Chicago was recently appointed by Governor Small a member of the Illinois Commerce Commission. Mr. Wright, a negro, is an attorney and has for several years been recognized as an influential political figure in the Second Ward of Chicago, which represents a very strong negro vote. He has been closely identified with the Thompson-Lundin-Small political group, and his appointment has been looked on by people of Chicago as a strong bid by Governor Small for the negro vote of Chicago and the State.

Mr. Wright succeeds Alexander J. Johnson, who was made insurance commissioner to replace Thomas Houston. The latter is reported to have resigned because of political interference in his department.

Mr. Wright has been closely associated with the Thompson régime in Chicago for eight years. He was assistant corporation counsel and was also retained for a time as a special attorney for the city. In this latter capacity he is reported to have received considerable sums from special appropriations which were paid as expert fees. This has been the subject of considerable discussion and controversy in Chicago.

Providence Employees Accept Five-Cent Increase

By a vote of 1,307 to 387, the employees of the United Electric Railways, Providence, R. I., have decided to accept the new wage and working agreement, giving the men an increase in wages of 5 cents an hour. The new agreement replaces that which expired on Oct. 31, 1923, and will continue in effect until Oct. 31, 1924. Besides the advance of 5 cents an hour it increases the time guaranteed "spare men" from six and a half to seven hours a day and approves some changes in working hours.

Under the new agreement conductors and motormen will be paid 56 cents an hour for the first three months of service, 58 cents for the next nine months, and 61 cents after the first year. Operators of one-man cars will receive 5 cents an hour in excess of the rate paid on two-man cars. Operators on snow plows, men in the freight and express departments and trainmen who are engaged on some specified special work will receive pay slightly in excess of the regular platform wages.

When the agreement under which the employees had been working expired on Oct. 31, it was decided between the officials of the two organizations that the men should continue under the old

agreement until the new one should be drafted and accepted by both parties to the contract or definitely rejected by one of them.

The agreement drawn up by the union called for an increase of 19 cents an hour for platform men. The company refused to consider the demands and suggested that the entire matter be settled by arbitration. After about two weeks of a deadlock the company consented to meet the union representatives in conference, with the result that the entire matter has been terminated in conference.

Old Age Pension Plan for Ashland Employees

The Lake Superior District Power Company, Ashland, Wis., has announced a service annuity or old age pension plan which became effective Jan. 1, 1924. A year ago at Christmas time the company started its welfare plan by giving insurance policies to its employees. This Christmas these policies were renewed and increased in amount. Besides insuring the lives of its electric, gas and electric railway employees the company now insures independence in old age for its loyal employees.

Briefly, this plan provides for the retirement of men employees at the age of sixty-five and women employees at the age of sixty and for the retirement, under certain conditions, of men employees at sixty and women at fifty-five years of age. The amount of pension paid is in proportion to the length of time that the employee has been in the service of the company and the average salary during this period. The plan is administered by a board of five trustees, all of whom are officers or employees of the company.

Experts Employed to Help Solve Los Angeles Traffic Problems

The Los Angeles Traffic Commission, anxious to obtain relief from the traffic congestion there, has engaged experts and engineers to institute a survey and plan a traffic system for the metropolitan area—Los Angeles and environs.

The engineers engaged are Frederick Law Olmstead, Boston; Harland Bartholomew, St. Louis; C. H. Cheney, Los Angeles, and E. O. Mills, St. Louis; also Major R. F. Kelker, Jr., Chicago.

Major Kelker spoke at the Traffic Commission's last meeting in regard to mass transportation, with particular relation to the transporting of passengers by standard transit lines. He expressed the fear that it would be long before Los Angeles could afford to construct subways, which would cost up to \$5,000,000 a mile. He recommended studies regarding the feasibility of using open cuts as a solution for outlying areas from 3 to 5 miles.

He stated that the favorable climate of Los Angeles made a facility of this kind available, whereas in many other localities such construction was not efficient. He further suggested that concrete elevated transit structures be

carefully considered by Los Angeles authorities, although he refrained from any definite recommendation as he had been in the city only a few days and had not completed a thorough study of this phase of the traffic relief plans of the commission.

Henry E. Ehlers New Transit Director in Philadelphia

Henry E. Ehlers, assistant engineer of the Pennsylvania Public Service Commission, on Jan. 3 was appointed Director of the Department of City Transit of Philadelphia by Mayor-elect Kendrick. He succeeds in this capacity W. S. Twining.

In 1914 Mr. Ehlers went to Harrisburg as a draftsman in the engineering department of the Public Service Commission. He advanced rapidly, being appointed assistant engineer to the commission, and his ability was so conspicuous that W. D. B. Ainey, chairman of the Public Service Commission, indorsed Mr. Ehlers for appointment to the transit department.

Mr. Ehlers is thoroughly familiar with Philadelphia's transit problems, particularly from an engineering viewpoint. He is a former director and treasurer of the Engineers' Club of Philadelphia, a former president of the Engineers' Society of Pennsylvania and a member of the American Society of Mechanical Engineers. Mr. Ehlers was born in Philadelphia, forty-four years ago, and after his education at the Northeast Manual Training School and the engineering department of the University of Pennsylvania, he served for twelve years as professor of experimental engineering at the university and for two years was mechanical engineer of the New York Shipbuilding Company, part of which time he spent at sea.

In view of the fact that during the next four years the incumbent of the office of the Department of Transit will be responsible for the expenditure of millions of dollars in extension of transit development in the city of Philadelphia, the post is a very important one, over which Mayor Kendrick spent much time in consideration of the prospects.

The man who was considered along with Mr. Ehlers to fill the position was Solomon M. Swaab, engineer of the Keystone State Construction Company, who has been appointed as consulting engineer to the Mayor. This is an entirely new office, but it will permit Mr. Swaab to work with the transit director and at the same time be in a position to use his engineering skill in advising on other problems. Mr. Swaab has been connected in a responsible capacity with the construction of nearly every big public project in Philadelphia in the last twenty-five years. He was with the Philadelphia Rapid Transit Company in charge of the design of the city subway system and later on the construction of the Market Street subway.

Bus a Traction Adjunct

President McCarter Says System of the Future Will Be a Combination of Cars and Buses Under One Management

The bus is not a substitute but is a valuable ally to the electric railways. The electric railway still is and will continue to be the main dependence of any system of local transportation.

These are opinions expressed on Jan. 8 by Thomas N. McCarter, president of the Public Service Railway of New Jersey. They were pronounced by him in a lecture under the Cyrus Fogg Brackett foundation to the students of the Green Engineering School of Princeton University.

Mr. McCarter said that in these days of organization, in these times when the social habits of the nation make co-operation a necessary part of an effort to provide for public welfare, there can be no greater folly than to leave the provision of adequate local transportation to the mercy of individual purveyors, interested only in the profits that they can make.

As Mr. McCarter sees it the development of the bus has brought into being another transportation facility, but it has not changed the requirements for transportation or altered the necessity for transportation systems that shall provide service for communities as a whole and play their due part in building up those communities in the way that shall provide the maximum of convenience and comfort for the people. Mr. McCarter said:

The electric railway is still and will continue to be the main dependence in any transportation system. To injure it, to destroy it by competition, is to deprive the public of its most essential transportation facilities and leave no adequate substitute. The bus is not a substitute, it is an adjunct. It should not be made an enemy, but an ally. Electric railway and bus in co-ordination can furnish the people of this country with local transportation fitted to public needs and the transportation system of the future will be a combination of cars and buses under the same management, each occupying the field for which it is best suited.

It is the present and not the future of the electric railway industry which gives the cause for concern. Local transportation, as I have defined it, will always be necessary in this country and can always be most efficiently and economically conducted through privately-owned transportation companies. And this being so, then eventually government and companies, public and operators will arrive at a *modus vivendi*, under which the "best possible service" shall be furnished at the lowest "possible cost."

But, in the meantime, the most careful consideration of the public, the best efforts of those in charge of and those connected with the properties, the honest and unbiased assistance of the industry, are needed to restore it to a condition of economic stability and to put it in a position where it can attract from the thrifty people of the nation the capital it needs for its expansion and betterment.

Mr. McCarter argued that government or municipal ownership of electric railways is less satisfactory than private ownership. He said in this connection:

We hear much of the municipally operated tramway system of Glasgow, and it is indeed an efficiently and economically operated property, but the part that it has played in community development is strikingly small in comparison with that taken by the privately-owned companies of America.

Compare the service given to Glasgow and its suburbs with that given to Newark and its suburbs. The Glasgow system provides 200 miles of track to serve a population of 1,300,000, or a mile of track for each 6,500 people; Newark and its suburban communities have 215 miles of track to serve a population of 652,000—a mile for each 3,032 people.

Private initiative, based upon hope of individual reward, if you like, has put at the command of American cities local transportation systems which have raised the opportunities for healthful and comfortable living, to a high level. Municipal ownership and operation in the United Kingdom has been content to meet existing conditions. It has lacked initiative, and in consequence has contributed much less toward civic development.

Dorchester Tunnel Extension Plan Accepted by Boston Elevated

The directors of the Boston Elevated Railway have accepted Chapter 480 of the Acts of 1923, under the authority of which the Dorchester tunnel is to be extended to a point south of Columbia Road, thence, on private right-of-way, parallel to the tracks of the Old Colony Division of the New York, New Haven & Hartford Railroad to Harrison Street, and thence over the Shawmut branch of that railroad, to a transfer terminal in the vicinity of Peabody Square. Trains of surface cars will be operated over the remainder of the branch to the present railroad station in Mattapan.

The City Council promptly accepted the act and the board of trustees of the Elevated have for some time been urging the directors to do likewise. The directors, however, felt that, as \$1,000,000 of new capital for cars and other equipment would be made necessary to carry out this enterprise, and no way of raising this capital has yet been found, careful consideration must be given the matter.

The directors, in announcing their decision to Chairman Jackson of the board of public trustees, said:

In view of the financial situation of the company, the directors have been very reluctant to accept the act for the extension of rapid transit facilities in Dorchester. This extension will not only call for a substantial additional capital expenditure, but is also likely to result in operating losses.

The directors understand that the present floating indebtedness of the company amounts to approximately \$4,000,000, and that this amount is likely to be substantially increased in the future by reason of commitments for further capital expenditures. The directors know of no securities which the company is free and able to place at the present time for the purpose of raising new capital, except about \$500,000 of additional bonds, although they understand that the trustees propose to ask the legislature for authority to issue something like \$2,000,000 additional bonds against the premiums paid in on the stock of the West End Street Railway.

While the directors, in view of all the circumstances, have voted to accept the act in question, they think it only fair to state that it is doubtful whether they will be willing to consent to any further extensions or additions involving capital expenditures, so far as their consent is necessary, unless some satisfactory method is found for providing the necessary money for such expenditures.

The annual report of the board of trustees to the Legislature shows that for the proper development of this system there will be required from \$10,000,000 to \$15,000,000 of new capital within a few years, and emphasizes the need for some action to permit of this financing.

Names of Buffalo Trial Staff Members Announced

H. G. Tulley, president of the International Railway, Buffalo, N. Y., announces that the new trial staff appointed by J. J. K. Caskie, general attorney in charge of negligence and litigated cases, will consist of the following members:

Raymond C. Vaughan, chief of trial counsel of the recently organized firm of Rann, Vaughan, Brown & Sturtevant. Mr. Vaughan is also the chief trial attorney for the New York Central Railroad in the Buffalo district.

Gordon Steele, of the firm of Botsford, Lytle, Mitchell & Albro.

Olin T. Nye, formerly of the firm of Penney, Killeen & Nye.

Selby G. Smith, of the firm of Kent, Means & Smith.

Frederic R. Twelvetees, formerly associated with Penney, Killeen & Nye.

Robert L. Himes.

Joseph J. Kelly and Robert E. Miller, of the firm of Kelly & Miller, formerly associated with Locke, Babcock, Spratt & Hollister.

The negligence cases in Niagara and adjoining counties will be tried by Clarence R. Runals of the firm of Cohn, Chormann & Franchot, Niagara Falls.

A similar system of handling negligence claims and litigated cases is in effect with the Mitten Management in Philadelphia.

Electrification Project in Texas to Proceed

Materials have been ordered and construction work will start at once on the electrification of the Missouri-Kansas-Texas Railway's line from Dallas to Denton, Tex., a distance of 47 miles. The electrification is to be done by the Dallas Railway and allied interests in fulfillment of a commitment made in 1917 when the local railway franchise in Dallas was granted to the Strickland-Hobson interests.

Electrification of the M.-K.-T. branch line has been held up for nearly a year on account of litigation brought by property owners on Fairmount Street, along which the Dallas Railway proposed to lay tracks for the new interurban line to enter the city. This litigation the company has won.

The Dallas-Denton line, or the electrified Katy, as it is now coming to be known, is regarded as a link in the proposed interurban line that will eventually connect Dallas and Wichita Falls. Funds had been raised and surveys of proposed routes completed for this line, when financial stringency of the war period made further financing impossible. Since that time the project has been permitted to remain dormant.

Richard Meriwether, vice-president and general manager of the Dallas Railway and president of the Texas Interurban Railway, is in charge of the electrification of the Dallas-Denton line.

The electrification project will cost about \$1,250,000. It is expected that the work will be completed next fall.

Hollywood Subway Sanctioned

California Commission Has Approved \$3,800,000 Outlay by Pacific Electric Railway in Los Angeles

The Pacific Electric Railway, Los Angeles, announces it will begin work on its proposed Hollywood rapid transit subway, before the expiration of the sixty-day time limit affixed by the California State Railroad Commission in its order just issued. The plan calls for the construction to commence at Hill Street Terminal. The line will come to grade at Glendale Boulevard and First Street.

The commission granted a permit to the railway in the form of an order directing the company to commence its Hill Street terminal subway, making the order effective ten days from Dec. 13, the date of issuance. The commission orders work to start within sixty days and to be completed by March 1, 1925, unless an extension is granted for good cause, according to the text of the permit. It is anticipated construction will be completed within eighteen months.

The proposed subway is approximately 1 mile in length. It will cost about \$3,000,000. The expenditure for the required right-of-way will represent an outlay of \$800,000.

Futile efforts were made by the Los Angeles Traffic Commission, the railway and other civic bodies to have the terminal of the subway extended to Pershing Square, a city park, one block south of the railway company's Hill Street terminal. The idea was to establish at Pershing Square a central terminal from which other subway branches could ultimately radiate. The Railroad Commission studied the advisability of locating the terminal under Pershing Square rather than at the originally-proposed Hill Street terminal, but the board of engineers failed to agree as to the logical site. The chief engineer of the commission reported there was little hope of an agreement being reached and in order to avoid delay he recommended construction of the subway as originally planned. The Railroad Commission issued its order in the hope of relieving the present deplorable traffic conditions in Los Angeles.

The subway, when completed and in operation, will give the Hollywood district rapid transit and shorten the running time to the Glendale district and other points in adjacent San Fernando Valley sections that are served by the Pacific Electric interurban lines. The subway will relieve traffic congestion to a great extent in the busy sections of Los Angeles where Pacific Electric interurban and local trains operate through and out of the city on Sixth Street as well as Hill Street. Approximately 1,100 cars a day will be removed from Hill Street that serve the Hollywood district and 915 trains a day from Sixth Street, that operate

between Los Angeles, Glendale and Burbank territory.

The Railroad Commission in issuing its permit pointed out that should the City Council and the Board of Public Utilities of Los Angeles withdraw their opposition to Pershing Square as a central subway terminal, the additional cost to the railway to extend its subway from the Hill Street terminal to the Square would be \$1,160,000.

The Hollywood subway of the railway was ordered to be constructed by the Railroad Commission two years ago, when the commission authorized the Pacific Electric Railway to increase its rates. In fact the increase in fares between Los Angeles proper and Hollywood territory was made conditional on the construction of the subway to provide rapid transit to the various communities affected by the rate increase.

Ottawa Franchise Approved by Voters

The voters of the city of Ottawa, Ont., by a vote of two to one on Jan. 7 passed the new franchise agreement, whereby the Ottawa Electric Railway will charge a 5-cent fare for five years, with the Sunday and limited tickets discontinued.

In 1921 the property owners voted two to one against the purchase of the Ottawa Electric Railway. In 1922 the electors at large rejected service-at-cost and municipal ownership and voted for a contract along the lines of the present franchise.

In 1923 the company made two offers to the city—one of which was called "service-at-cost," but was in reality a partnership agreement, the other being an offer to sell. Both offers were rejected.

At the election just held an agreement such as the voters asked for in 1922 was put up to the people. Besides retaining and guaranteeing the 5-cent fare for five years the agreement binds the company to the construction of 17 miles of track and the purchase of forty-seven passenger cars at an outlay of \$1,500,000.

Negotiations looking toward a settlement of the franchise question in Ottawa have been in progress since last August. On Aug. 10 the Mayor wrote to the company asking under what agreement it would undertake the Feustel improvements and extensions. The company submitted a proposal with certain changes which were summarized in the *ELECTRIC RAILWAY JOURNAL*, issue of Dec. 8, 1923.

The Ottawa company pointed out that under the old agreement the city had the right to buy the railway in August, 1923, but the city declined. The old agreement provided that the city might buy at the end of any five-year period after August, 1923, the price to be set by a board of arbitration. Under the new agreement the city still has the right to buy at stated periods and under the same terms.

Assessment Against Property Owners for City's Purchase of Railway Illegal

The full bench of the Supreme Court of Massachusetts has decided that an assessment made by the Mayor and City Council of Attleboro upon land of property owners in that city for the cost of purchasing the Norton, Taunton & Attleboro Street Railway was unwarranted and illegal, and that Lewis S. Chilson and other citizens of Attleboro are entitled to have the proceedings reviewed.

Under a special act of the Legislature of 1919 the city of Attleboro, in conjunction with Taunton, Norton and Mansfield, exercised an option under the statute and purchased the bonds and stocks of the railway. The share of the cost to Attleboro was \$30,000.

Chief Justice Rugg, who wrote the opinion, says that it was in no sense an acquisition, under the power of eminent domain or by immediate purchase of the franchise, rights and properties of the railway under the authority conferred by Section 2 of the act. The corporate entity of the railway continues without interruption or alteration. The stockholders and creditors have changed. The corporation itself remains unchanged.

In its decision the court said in part:

Subsequently the City Council of Attleboro laid an assessment upon the lands of the petitioners and others. The only authority for betterments was a clause that "In case the said cities and towns . . . shall purchase or take and operate the said street railway . . . a portion of the purchase price, not exceeding 50 per cent paid by any city or town, may be assessed upon the owners of estates in such city or town specially benefited thereby. . . ."

The assessment of a substantial part of the cost of an investment by a municipality in stocks and bonds of a private corporation forms a novel basis for a betterment assessment. Such an investment partakes of a private business adventure. The corporation may sell its property to or consolidate with other companies under certain conditions. A receiver may sell all its property. In other ways it may be that financial reverses would wipe out the investment. The entire control of the street railway is left to the corporation and remains under the direction of its governing officers.

\$362,998 Deficit Under Five-Cent Fare in Jersey in November

The Public Service Railway of New Jersey had a deficit of \$362,998 for November, 1923, the second month of operation under the 5-cent fare, according to a report filed with the State Board of Public Utility Commissioners on Jan. 10. There was a deficit of \$8,911 for November, 1922, under the 8-cent fare. It will be recalled that the company filed a petition for a 10-cent cash fare, but that the commission suggested operation at a 5-cent fare for an experimental period of four months.

The revenue from transportation was \$1,754,246, compared to \$2,036,601 in November, 1922. Total operating income was \$79,692 against \$416,024 in November, 1922. Operating expenses were \$1,523,466 against \$1,462,540 for the same month of 1922.

Three Men Make Good Showing.—A record of 102,000 miles without a single accident was established during 1923 by three trainmen on the city and inter-urban systems of the Wisconsin Public Service Corporation, Green Bay. The men made no accident reports whatever and in addition to having clear records were honored with a number of "D" credits, given for avoiding near accidents.

Lease Approved.—The Public Utilities Commission has approved the lease by the Connecticut Company to the New York & Stamford Railroad of a track in Stamford, Conn., extending to the New York state line. The lease is for five years at \$10,000 a year.

Mr. Nash Lecturing on Public Utility Economics.—L. R. Nash, manager of public relations Stone & Webster, Inc., Boston, Mass., has been conducting a university extension course in public utility economics before about 200 employees of the Boston Elevated Railway. The course is being repeated for members of the Stone & Webster organization and representatives of a number of affiliated banking houses. Mr. Nash plans to compile and publish all the lectures that are associated with the course.

Appeals Decision.—The United States Collector of Customs at Buffalo has taken an appeal to the United States Circuit Court of Appeals from the decision of Federal Judge John R. Hazel in Buffalo granting a permanent injunction to the International Railway in its action to have the customs department maintain inspectors on the Upper Steel Arch Bridge across the Niagara gorge at Niagara Falls Sundays and holidays so as to facilitate the transportation of passengers over the Park & River division of the International. The customs collector threatened to withdraw inspectors and close the bridges at Niagara Falls and Lewiston Sundays and holidays unless the railway paid the overtime wages of the Federal inspectors. The decision of Judge Hazel forces the customs department to provide inspectors at all times so as to keep the bridges between the American and Canadian sides open to the public.

Mayor Urges Railway Purchases.—Mayor Rolph of San Francisco, Cal., in his inaugural message has reiterated his stand in favor of the purchase by the city of the Market Street Railway properties and their amalgamation with the municipal lines.

Will Name Arterial Highways.—In order to speed up traffic, the Kansas City, Mo., Safety Council is preparing a list of a number of thoroughfares, to be known as arterial highways, where all crosstown traffic will have to come to a full stop before attempting to cross or enter such a highway. In order to test out this plan only a few of the most traveled thoroughfares running north and south will be named in the original ordinance. More may be added later if the plan proves a success.

Foreign News

English Railway Electrification Progresses

Plans are now being carried out actively for the electrification of large additional sections of the suburban railways in the vicinity of London, forming part of the Southern Railway. This company was formed about two years ago as one of the great amalgamations of British railways. It comprises the railway companies formerly known as the London & Southwestern, the London, Brighton & South Coast and the Southeastern & Chatham.

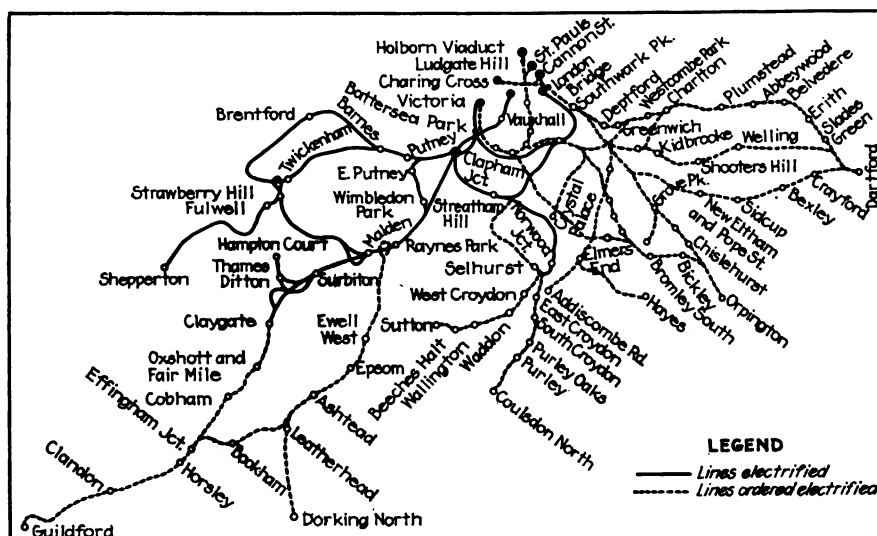
Each of these companies had electrification schemes for suburban lines in prospect, two of them for extensions, and the third, the Southeastern, for an initial installation. For the Southwestern section plans have been approved for the extension of the electrification to Guildford and Dorking. This

lowering estimates of the cost of electrification have been made public:

LONDON, BRIGHTON & SOUTH COAST SECTION	
Line equipment.....	£276,600
Motors and trailers.....	395,000
SOUTH EASTERN SECTION	
Conductors and rails.....	£786,000
Electric equipment of stock.....	730,000
Substations and d.c. feeders.....	720,000
Conductor rails and track bonding.....	515,000
Electric light and supply system.....	200,000
High-tension feeders.....	315,000
Repairs to stations.....	300,000
New car sheds.....	100,000
Repair and inspection shops.....	110,000
Signaling, permanent way, drainage, etc.....	324,000
SOUTH WESTERN SECTION	
Extension to Guildford and Dorking.....	£840,000

British Trackwork for Glasgow

Departing from the policy which has been pursued previously to give orders to the lowest bidders, Glasgow Town Council on Dec. 13 decided that a contract for special trackwork should be



Electrification Under Way or in Operation in Vicinity of London, England, on the Southern Railway

work, along with that on the other sections, will cost about £5,000,000 and it is intended that it will be completed by the end of 1925. The arrangements will provide for carrying on the electrified lines 200,000,000 passengers per annum.

The London, Brighton & South Coast section is carrying on the conversion of more suburban lines, which will be electrified with an overhead contact line on the single-phase system, whereas the others will all be direct current with the third rail.

Work on the Southeastern conversion is only beginning, its lines hitherto having been operated exclusively by steam power.

Altogether the Southern Railway has at present 85 route-miles (248 miles of track) of electrified lines, which will be increased to 145 miles of route involving 358 miles of single track. The fol-

lowing awarded to Hadfield, Ltd., Sheffield, for the sum of £9,794, although the tender received from the United States Steel Products Company was £8,568. The tramways committee had by a majority recommended that the United States company's tender should be accepted. It was contended that, especially in view of extensive unemployment, the work should be carried out in Britain.

Reversible Tramcar Staircase.—The Metropolitan Electric Tramway Company, London, is conducting experiments with a new reversible staircase for its double-deck cars. This is so constructed that the conductor can turn it round at each terminus, so that both front and rear staircases face the near side of the car. Tests show that an interchange of passengers can be made in half the time which would be taken in the case of an ordinary car.

Financial and Corporate

Elevated Collateral Sold

Noteholders of the Chicago Lines Come Into Possession of Property Under Foreclosure

The common stock of the Chicago Elevated Railways' collateral trust, which controls the four elevated lines in Chicago, was bought at public sale on Jan. 5 by a committee representing holders of \$14,000,000 of notes, which have been in default for several years, and for which the common stock was collateral.

The effect and possibilities of the sale have been set down as follows:

1. The Chicago elevated lines will be consolidated into a new corporation, controlling both ownership and operation, scaling down capitalization \$34,700,000, from about \$121,895,000 at present to \$87,196,500, by wiping out the old Chicago Elevated Railways preferred and common shares. Those have a par value of about \$40,000,000, but market value of only a small fraction of that.

2. Control will pass to the Commonwealth Edison Company interests as the largest stockholder. The new corporation will have \$20,329,500 common stock at par value. Of that stock the Commonwealth Edison Company will receive a considerable part in satisfaction of bills for electric power.

3. Facilitation of unification of both elevated and surface lines if the city wishes to purchase both.

The noteholders' representative was the only bidder for the common stock of the Chicago Elevated Railways collateral trust.

Since the noteholders' reorganization plan was announced several months ago, groups of old preferred stockholders several times have attempted to block operation of the plan. The final litigation was disposed of recently. Circuit Judge Hugo M. Friend denied a petition for a receiver and refused to intervene in the sale of the common stock. Previously, another group of stockholders had obtained from Judge Friend an injunction against the sale, but the Illinois Appellate Court reversed the order and pronounced the sale legal.

TROUBLE TEN YEARS OLD

In reviewing the affairs of the elevated Lines the Chicago *Tribune* said that the financial difficulties of the roads date back nearly a decade. In 1914 the Chicago Elevated Railway collateral trust sold the \$14,000,000 issue of notes and pledged its common stock as collateral. The notes were extended on maturity to July 1, 1919, but since that time they have been in default, both as to principal and interest.

When the elevated lines admitted inability to pay off this indebtedness, a noteholders' protective committee was formed, but the noteholders took no action until last year. Then they formulated a reorganization plan and obtained permission from the Illinois authorities for a consolidation.

The capitalization of the new consolidated corporation will consist of

\$46,704,000 underlying mortgage bonds, \$1,600,000 of first lien and refunding mortgage bonds, \$18,563,000 of adjustment debenture bonds and \$20,329,500 of common stock. The underlying bonds will go to holders of the old underlying securities, while the rest of the new securities will be apportioned among holders of the old junior securities as set forth in the reorganization plan, made public last summer. The total capitalization of the new elevated corporation would be \$87,196,500.

The property value of the constituent companies was set at \$89,514,932 for rate making purposes by a valuation of the Illinois Public Utilities Commission on June 30, 1919.

Merger of Coast Companies in Jersey Proposed

Application has been made to the Board of Public Utility Commissioners of New Jersey in behalf of a syndicate composed mostly of men from the Central West to bring together under one management four traction companies, an electric light company and a water company in New Jersey. H. S. Clark, president of the Indiana Power Company and head of the group, said that the Eastern Power Company would be the parent body. The parent company would combine the Atlantic Coast Electric Light Company and the New Jersey Water & Light Company. The trolley lines to be merged are the Seashore Electric Railway, the West End & Long Branch Railway, the Seacoast Traction Company and the Asbury Park & Sea Girt Railroad. The organizers plan to refinance these concerns by issuing bonds to retire outstanding obligations of about \$4,332,000 and to furnish about \$500,000 new capital for expansion.

Five Months Operation Shows Deficit

The Interborough Rapid Transit Company, New York, N. Y., for November reports a balance of \$220,277 after deducting the 4 per cent dividend on the Manhattan Elevated stock and all other charges except the sinking fund on the first mortgage 5 per cent bonds which does not become operative until July 1, 1926, but which must be deducted from the earnings of the system before arriving at the sum available for dividends on the Manhattan stock. The company for the five months ended Nov. 30, 1923, showed a deficit of \$853,490. The company reports a total revenue of \$22,919,307, from which was subtracted \$16,097,103 for operating expenses, taxes and rentals paid the city and \$1,275,270 for maintenance in excess of contractual provisions. Fixed charges amounted to \$5,400,421.

Refunding Refused

Foreclosure and Reorganization of United Railways, St. Louis, May Follow Court Action

United States District Judge Faris of St. Louis on Jan. 2 denied the petition of Rolla Wells, receiver of the United Railways, for permission to issue \$4,100,000 of receiver's certificates to retire a similar sum of general mortgage 4s and prevent the entire issue of \$30,000,000 of general 4s from going to default.

FORECLOSURE AHEAD

The decision of the court virtually forces an immediate reorganization of the railway through foreclosure proceedings of bondholders. In denying the petition of the receiver Judge Faris overruled former Judge Henry Lamm, special master, who had recently recommended that issuance of the certificates be authorized. Mr. Lamm in his report held that a year's interval would give the company time in which to work out its differences with the city as to valuation and mill taxes and probably permit it to obtain suitable franchise extensions.

In touching on these points Judge Faris said:

As to the question of a franchise—the people must ride or walk, and until aerial navigation is perfected they must use the streets. If there is a necessity for street cars, it is incumbent on the city to grant franchises. If the future demands a change in the mode of transportation the fact that, on existing streets, the company had a franchise for 100 years, will afford small consolation to stockholders or bondholders. They will be in the same position of the man who was fully and fashionably equipped sartorially, but had no known destination.

In reviewing the situation as to the \$30,000,000 of general 4 per cent bonds soon to be in default, Judge Faris pointed out that no provision had been made for the \$6,500,000 of St. Louis & Suburban bonds, the holders of which instituted foreclosure proceedings on Nov. 6. The Suburban bondholders have asked for a separate receivership and segregation of the Suburban property from the United Railways. The court said:

It is difficult to see how foreclosure can be avoided inasmuch as the Suburban bonds are already in default.

Foreclosure of the Suburban bonds might result in segregation of the Suburban system. Such segregation might be financially helpful to some interests, but it could not be helpful to the public.

If incurable defaults are to happen, it is only fair to permit them to happen to all, so that the remedies can proceed on an even tenor.

Judge Faris added that he was not convinced that the company was in danger of great loss through early foreclosure and reorganization.

The court has since taken under consideration a plan to merge all foreclosure suits filed against the United Railways and it is expected he will set a special day on which to hear argument on that point.

A motion to consolidate the various suits was filed with the court on behalf of the company by former Judge Henry S. Priest, its counsel. He contended

that this plan would facilitate all of the litigation and effect a financial saving for all concerned.

The only foreclosure so far filed affecting the issue of \$30,000,000 general mortgage United Railways 4s was brought by an individual who holds \$4,000 par value of the bonds.

Issues in default on which suits have not been filed are those of the Compton Heights line, \$986,000, and the St. Louis Transit Company, \$9,790,000.

Abandonment of Some Birmingham Lines Sought

Negotiations seeking the consent of the city authorities to the abandonment of a portion of the tracks of the Tidewater line and to the rerouting of the Tidewater cars, have been opened by the receivers of the Birmingham Railway, Light & Power Company with the City Commission of Birmingham, Ala. Solution of the problem of the Tidewater line, it is stated, must be reached before the reorganization of the company can be perfected.

If present negotiations are successful, it is stated by the receivers, the valuable portions of the Tidewater line, which is said to be losing money steadily, probably can be saved. Should the negotiations fail, the Tidewater line probably will be junked in the re-organization.

Surveys showing the plans for the Tidewater line are being prepared by the receivers and will be filed with the commission immediately. The matter was discussed at an informal conference with the commission several days ago and further conferences are expected to be held.

Suggestions have been made by the receivers that the Tidewater line be divided into two lines. This plan calls for junking that portion of the Tidewater line from Forty-first Street and Avenue C to the Terminal station at Fifth Avenue and Twenty-sixth Street, north. The proposal also suggests that the western end of the line stop at Nineteenth Street and Fifth Avenue, north.

Protest Over Oakland Reorganization

Louis H. Bien, the trustee in bankruptcy of the United Properties Company of California, holding all of the capital stock of Oakland Railways, and Frederick Olachewski, a stockholder of the San Francisco-Oakland Terminal Railways, have filed a petition with the California Railroad Commission for a rehearing of all matters connected with the application of the trustees for San Francisco-Oakland Terminal Railways for authority to transfer the properties of the San Francisco-Oakland Terminal Railways and subsidiary companies, and to issue securities, in carrying out the proposed reorganization plan recently authorized by the commission.

Railway Funds Wisely Invested

Public Trustees in Massachusetts Make \$200,000 Profit, but Come in for Censure

An entirely new issue in electric railway legislation has developed in Massachusetts in connection with the handling of funds by the board of public trustees of the Eastern Massachusetts Street Railway. It is a matter of record that for some time the trustees have invested the company's surplus cash in high class securities and that they have made a profit of about \$200,000 for the railway by such investments.

Representative Richard D. Crockwell, in the Massachusetts Legislature, takes the view that a law must be enacted to make such handling of railway funds illegal on the ground that although it was profitable to the Eastern Massachusetts in this case, it might result in losses in other cases. Had there been losses instead of profit from the investments made by the Eastern Massachusetts Street Railway trustees the Commonwealth of Massachusetts would have been compelled to make up the deficit, as it is responsible for the acts of the trustees. An order has, therefore, been introduced in the Legislature to investigate the acts of the trustees. The trustees say:

All investments by the Eastern Massachusetts Street Railway have been made with the sanction and by direction of the entire membership of the board of public trustees. None of these investments was of a speculative nature.

Reports on these investments have been made in the annual returns to the Department of Public Utilities and included in each instance a detailed list of the securities held and they have been and are now public records.

When the public trustees assumed control of this road they received \$3,500,000 of new cash under the readjustment plan from the sale of \$2,500,000 bonds and \$1,000,000 common stock paid for at par by assessments on Massachusetts Electric companies and Bay State stockholders.

This money could not be used advantageously at once and was invested in high grade bonds pending such use. From time to time as the need for this money arose these bonds have been sold. The securities purchased were of such high grade that they were always immediately salable at a price at least equal to that paid for them. The purpose of these purchases was not in any sense to secure a profit on the sale but merely to obtain an adequate return on these funds pending their investment in the property itself.

The public trustees set up a reserve for depreciation and in a similar manner invested these funds pending the necessity of applying the reserve.

During 1923 only \$223,000 of such bonds were purchased and these only for the purpose of reinvestment of money received from the payment of bonds at maturity. During the year \$375,000 of bonds previously acquired were exchanged for new issues of the same companies.

In 1923 the company was a consistent seller of these securities as the necessity for money arose to enable it to pay for new cars and other equipment. During the year bonds to the par value of \$1,482,000 were sold.

The company has never owned a share of Sinclair Oil, American Telephone, American Agricultural Chemical or Armour Company stocks. It has held and does now own underlying bonds of some of these companies.

It has made relatively small investments in such standard investment stocks as Woolworth preferred, U. S. Steel preferred, Standard Oil of New Jersey preferred, First National of Boston, Bethlehem Steel preferred, and Electric Bond & Share preferred.

The par value of these stocks so held is \$215,000. The company has never sold a share of these preferred stocks since they were acquired. Woolworth preferred stock was called for redemption by that company.

It is true that by reason of these investments the public trustees have secured a return on funds temporarily idle larger than if such funds had been carried on deposit. It is also true that the company has sustained no loss through any of its investments.

\$47,642 Surplus in Rochester for Year

For the first time since the adoption of the service-at-cost contract between the Rochester lines of the New York State Railways and the city of Rochester, operations of the trolley lines in the city for the year ended July 31, 1923, showed a surplus. As reported by Charles R. Barnes, commissioner of railways, the amount of the surplus was \$47,642.

Revenues were stated as \$5,287,892 and costs at \$5,240,250. This is the third year of operation under the contract. Commissioner Barnes, in his report, said that there was little hope for a reduction in fare as the deficit of \$180,367 that existed on July 31 must first be wiped out.

Barring an increase in wages granted on June 1 operating costs varied little from previous years.

More than 100,000,000 passengers were carried on the Rochester lines during the fiscal year. Revenue passengers per car-mile averaged 7.9. During the year an average of 208,011 revenue passengers were carried daily on the lines.

Extension Granted on Ohio Traction Bonds

An extension of ten months, time has been granted by the Fifth-Third National Bank, Cincinnati, Ohio, to the Ohio Traction Company on notes in the sum of \$600,000, executed by the company and held by the bank. According to officials of the Cincinnati Traction Company, the majority stock of which company is owned by the Ohio Traction Company, the notes represent the balance due on an original issue of \$845,000, bearing interest at 7 per cent and, authorized in 1920 by William C. Culkins, then Director of Street Railroads for the city of Cincinnati. The proceeds of the sale of the bonds were used by the company for improvements and betterments to the electric railway system.

When the bond issue fell due on Jan. 1, 1923, the Cincinnati Traction Company paid off \$245,000 of the issue, and being unable to pay the remaining \$600,000, obtained an extension of nine months by the bank. When this expired on Oct. 1, 1923, the Ohio Traction Company, the parent company, gave notes for the \$600,000, thus paying off the remainder of the bond issue. These notes fell due Jan. 2, 1924, and in view of the existing unsettled conditions in the traction situation the Ohio Traction Company requested and obtained the extension.

\$13,000,000 of Bonds in San Francisco Refunding Operation

Financing for the account of the Market Street Railway, San Francisco, Cal., has been arranged to the extent of \$13,000,000, and bonds to that amount were offered publicly on Jan. 8 by a syndicate consisting of Dillon, Read & Company, Ladenburg, Thalmann & Company, New York; the Wells Fargo Bank & Union Trust Company, and the Anglo & London Paris National Bank, San Francisco. The bonds are a first mortgage issue, bearing 7 per cent interest, dated April 1, 1924, and due in 1940. They are priced at par.

The bonds are for refunding purposes, and their proceeds will be used entirely for discharging \$4,269,000 of five-year 6 per cent collateral trust gold notes, due on April 1 next, and \$9,239,550 of 5 per cent first consolidated mortgage gold bonds, due on Sept. 1 next.

Charles N. Black, president of the company, says:

None of the company's franchises expires prior to 1929. Thereafter franchises covering the operations of various of the company's lines mature, from time to time, until 1952. Lines on which franchises have matured in the past have been acquired by the city at a fair and satisfactory price, and under the terms of the mortgage the proceeds of any sale of the mortgaged property are paid into the sinking fund for the retirement of additional bonds. It is estimated, taking into account the maturities of franchises, that the available income during the life of the bonds will in every year be more than twice the interest charges on the bonds then outstanding.

The bonds are callable as a whole or in part by lot at 107½ to April 1, 1926, and thereafter at prices decreasing ½ per cent each year to maturity.

Controversy at Montreal Followed by Changes in Organization

At a meeting of the Montreal Tramways & Power Company directors, held at Montreal, Que., on Jan. 7, E. A. Robert, president of the company since its inception about fourteen years ago, resigned from the board. William C. Finley, formerly vice-president, becomes president. The board was also added to by three members elected from the ranks of the shareholders who were recently in opposition to the administration, and one of them, Alcide E. Beauvais, was named vice-president. Other new directors are F. B. McCurdy and Dr. Noe Fournier.

The Montreal Gazette of Jan. 8 said:

The recent turmoil that has occurred in Montreal Tramways & Power Company affairs could never have come about if the affairs of the company had not been shrouded in such complete secrecy. It is reasonable to suppose, therefore, and we have the assurance of an official of the company, that in future those details, of which the shareholders in particular, and the financial public in general, are entitled to know will be duly made public.

The resignation of Mr. Robert as president of Montreal Tramways & Power Company does not mean that he ceases to be president of the Montreal Tramways or of other companies controlled by the holding company.

Giving effect to the recent changes, the board now is composed as follows:

William C. Finley, president; A. E. Beauvais, vice-president. Directors: George G. Foster, Lorne C. Webster, J. M. Wilson, F. B. McCurdy, N. Curry, Dr. Noe Fournier and J. M. McIntyre.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were sold on Jan. 9 eighty-three shares of Interborough Metropolitan Company, \$5 lot, and \$5,000 Austin Street Railway first mortgage 5 per cent bonds due 1936, 75 per cent.

New Jersey Interurban Takes Over Operation.—The former Northampton, Easton & Washington Traction Company, Phillipsburg, N. J., was sold under foreclosure in 1922, and with the taking over of operation by the New Jersey Interurban Company, Easton, Pa., on Nov. 1, 1923, the receiver was discharged. There is outstanding by the new company 2,000 shares of capital stock, without par value, \$500,000 of second mortgage 5 per cent income bonds, due Jan. 1, 1950, and \$100,000 of first mortgage 7 per cent bonds, due Jan. 1, 1950.

Suburban Line Fails to Pay Interest.—The Philadelphia Stock Exchange has been advised that the Frankford, Tacony & Holmesburg Street Railway, Philadelphia, made no provision for the payment of the coupon due Jan. 1, 1924, on its first mortgage thirty-year 5 per cent bonds, due 1940. For the five years previous to 1923 the company operated at a deficit after the payment of fixed charges. The bonds are outstanding to the amount of \$400,000. They are followed by \$500,000 of capital stock. The road is 17 miles long. It connects Frankford, Tacony, Holmesburg and Torresdale.

Bonds Secured by Real Estate Are Offered.—Dillon, Read & Company, New York, offered for subscription on Jan. 7 at 100 and accrued interest \$2,500,000 of Philadelphia Rapid Transit Company real estate first mortgage 6 per cent gold bonds. The bonds are dated Jan. 1, 1924, and are due Jan. 1, 1944. The bonds are secured by a first mortgage on three modern car terminals of brick and concrete construction.

Committee Representing Bondholders Arranges to Advance Interest.—Holders of the general first mortgage 4 per cent bonds of the United Railways Company, St. Louis, have been notified that owing to the failure of the Federal Court to authorize the receiver to pay the Jan. 1, 1924, bond interest, the three committees representing bond holders have arranged to advance the funds needed to make the payment.

Notes Called for Redemption.—The Delta Light & Traction Company, Greenville, Miss., has called for redemption all of the outstanding 8 per cent serial gold notes dated Aug. 1, 1921, maturing on and after Feb. 1, 1924. They will be paid at 102 and interest at the office of the National City Bank of Chicago.

\$335,000 of Common Stock Authorized.—The Public Service Commission of Indiana has authorized the Interstate Public Service Company, Indianapolis, Ind., to issue \$335,000 of common stock at 75 in lieu of \$280,000 of prior lien stock authorized by the commission last October to be issued at 90.

\$672,000 of Bonds Authorized.—The Public Service Commission of Indiana has authorized the Indiana Service Corporation, Fort Wayne, to issue \$672,000 of 5 per cent bonds at not less than 80 and interest and to use the proceeds to reimburse the treasury for additions and improvements.

\$230,000 of Car Trust Certificates Offered.—The Fidelity & Columbia Trust Company, Louisville, Ky., is participating in a syndicate which is offering at 100 and interest \$230,000 of Louisville Railway car trust 6 per cent gold certificates, Series "B." The certificates are dated Jan. 1, 1924, and are due semi-annually to Jan. 1, 1934. The railway unconditionally guarantees the payment of principal and dividend warrants by indorsement on each certificate.

\$4,907,600 Fixed as Value of Halifax Property.—The Public Utilities Board has placed a valuation of \$4,907,600 on the property of the Nova Scotia Tramways & Power Company, Halifax, N. S. The rates to be charged consumers will be such as to give the company 8 per cent on this. The valuation includes, says the board's report, a fair value of such physical assets and such undertakings as a going concern of this kind has, as of Oct. 1, 1921, including reasonable and proper allowances for organization and legal expenses and going value. The company is reported to have outstanding \$2,250,000 of first 5's, \$1,500,000 of general 7's, \$2,078,800 of 6 per cent preferred and \$2,510,000 of common.

Increase in Surplus Earnings.—For the twelve months ended Nov. 30, 1923, the gross earnings of the United Light & Railways Company and subsidiary companies, Grand Rapids, Mich., was \$12,566,555, against \$11,648,359 for the same period ended Nov. 30, 1922. The surplus earnings available for depreciation, debt discount and common stock dividends was \$1,298,791. For the twelve months ended Nov. 30, 1922, the surplus earnings amounted to \$1,059,739.

Approval of Sale of Jennings Line Sought.—The Missouri Public Service Commission will hold a public hearing soon at St. Louis on the application of Wayne J. Stedlin to dismantle and sell for junk the St. Louis & Jennings Railroad to Joseph Greenspon's Sons Company, St. Louis. The railway extended from the end of the Bellefontaine division of the United Railways System in St. Louis, at Robin and Florissant Avenues, to Jennings, Mo., with a branch line on Helen Avenue. It went into bankruptcy several years ago. Mr. Stedlin informed the commission that he sold the property for the value of the second-hand material it contained and requested approval of the sale.

Traffic and Transportation

Experimental Operation Planned

One-Man Cars to Be Run on Probation at Berkeley—No Further Action in Oakland

For a period of six months one-man cars are to be run on probation on Dwight Way and Ashby Avenue, Berkeley, Cal. If at the end of that time the operation of the cars meets with general approval it is likely that all objections will be withdrawn to their use on minor lines.

W. R. Alberger, general manager of the San Francisco-Oakland Terminal Railways, has accepted the terms of the agreement and has promised that the safety cars will be operated in strict accord with the recommendations of the State Railroad Commission. Two of these recommendations were that flagmen be stationed at Adeline Street and Ashby Avenue and at San Pablo Avenue and Dwight Way and that the hours of duty of the flagmen be increased.

This new arrangement rescinds an ordinance passed many months ago by which one-man cars were prohibited from operating on any of the streets of Berkeley. There was only one dissenting voice in the Council to the new arrangement.

The action of the Council followed an indorsement of the one-man cars made by J. N. Edy, city manager, who previously had conducted an exhaustive investigation.

There is no change in the one-man car situation in Oakland, sister city to Berkeley, where the Mayor and one or two members of the City Council have been warring on the cars. Many threats of police action have been made, but the cars, to the number of about fifty, continue to be operated unmolested.

Applications for permission to run bus lines in outlying sections of Oakland are on file with the City Council. The San Francisco-Oakland Terminal Railways is one of the companies seeking such rights, and the Peerless Stage Company the other.

Mayor Davie and Commissioner Moorehead favor the stage company on the ground that to grant the application of the railway will be favoring a traction monopoly. Commissioners Carter, Baccus and Colbourn, however, have refused to take sides with the Mayor. In fact Mr. Carter has openly espoused the cause of the railway and Mr. Colbourn has voted with him on one or two occasions. Mr. Baccus remains neutral.

The lone city-owned bus, the Rosalie, continues to run on various Oakland streets, but no action has been taken

by the city to increase the number of municipal buses, although Commissioner Moorehead has asserted that he has a fund available for the purchase of additional vehicles. It is likely that in the spring there will be a referendum on the bus question.

Higher Fares in Toledo on Jan. 13

Fares at Toledo will be raised by the Community Traction Company to straight 7 cents with a 1-cent transfer charge on Jan. 13. With the fare stabilizing fund down to \$57,000 and \$300,000 as the minimum at which to raise fares the company officials have determined to recoup the fund according to the provisions of the Milner service-at-cost ordinance.

Recent wage increases and a larger maintenance appropriation for 1923 were largely responsible for the depletion of the fare stabilizing fund. Car riding has been greatly affected in the last two or three years through the use of privately-owned automobiles. In addition the operation of jitneys is estimated to have taken about \$750,000 in revenue away from the railway since the Milner plan has been in operation.

It is estimated that the advance in fare will increase receipts more than \$5,000 a month. It will, however, affect only car riders who had been educated to use tokens, sold at six for 40 cents. The number of users of tokens has totaled about 30 per cent of all the riders.

In a statement explaining the general situation to the citizens of Toledo, President Adams declared:

We wish to assure the citizens of Toledo that every effort will be made in the coming year to operate the property with the utmost economy. Much can be accomplished if we can secure the co-operation of the car riders and the other citizens of Toledo.

At present conferences are being held attended by officials of the Community Traction Company, the Toledo Edison Company, and the street railway commissioner's office looking toward agreement on a lower power rate.

Seven-Cent Fare Tariff Filed for Akron

The Northern Ohio Traction & Light Company, Akron, has filed with the Ohio Public Utilities Commission a rate to become effective in Akron on Feb. 1 which calls for a straight fare of 7 cents, with universal transfers or four tickets for 25 cents. This rate is only tentative and was filed with the commission to comply with the laws of Ohio. The company's Akron franchise expires on Feb. 1.

Fare Hearing Opened

First Session Held at Atlanta on Jan. 3
on Appeal of Local Company
for Increase

The opening hearing on the Georgia Railway & Power Company's petition for increased fares resolved itself into a sharp tilt between the railway and the jitney interests. The railway was represented by Preston S. Arkwright, president, and H. M. Atkinson, chairman of the board of directors. The jitney interests were represented by former Mayor James L. Key and Sam Schlesinger, president of the Atlanta Jitney Bus Association.

The hearing was held on the evening of Jan 3 at the Council chamber in the City Hall. It was presided over by Alderman J. R. Bachman, chairman of the special committee of the City Council handling the power company's petition. He opened the meeting by announcing that the Council had taken up the proposition of the company and had appointed a special committee to audit the books. He then called for a discussion of the proposed rate changes.

Former Mayor Key opened the discussion for the jitney men by declaring that the proposed changes would mean \$3,000,000 a year additional revenue for the railway and that he did not believe the company needed any such amount to continue in operation. The jitney, he said, gave the public a faster service than the railway and rendered a necessary public service. Mr. Key declared that it would be an outrage to take the jitney driver's business away from him. He was sharply called to order by Chairman Bachman for insinuating that the committee was acting unfairly.

President Schlesinger of the Atlanta Jitney Bus Association was the second speaker for the evening. He declared that the demand for jitney service was greater than the supply. There are 105 jitneys in his association. Mr. Schlesinger said that the railway had lines on more streets, comparatively, than any company in any other city with which he was familiar, and that if jitneys were excluded from streets on which the street cars were operated, the jitneys would be unable to approach the business section of the city, and might as well prepare to go out of business.

J. R. Smith, of the real estate firm of Smith & Rankin, defended the power company from a new angle when he declared that the proposed Highland Avenue extension of the railway would increase property value in that section by \$3,500,000. Jitney lines, he pointed out, do not increase property values. Property owners, by supporting the street railway in its efforts to make money and build necessary extension, could get all of their money back many times over in the increase of value of their holdings.

Guy W. Hamebaugh, a local insurance man, suggested a 5-cent fare for short hauls, a 10-cent fare for long hauls and the elimination of transfers.

Under such a system, he declared, both the railway and the jitney could live and flourish.

A second hearing will be held after the Council has completed its audit of the company's books.

The petition of the company, after setting forth that it was unable to continue to give adequate service or to take care of necessary improvements, under present conditions, contains several suggestions for relief, approval of which is asked of the Mayor and General Council.

COMPANY WANTED TEN-CENT FARE

The company asks approval of: 10-cent cash car fares, tickets to be sold for 6½ cents as at present; 2-cent charge for transfers; elimination of jitneys from streets on which street cars are operated; reasonable revision of its operating routes in the interest of better service; elimination of unnecessary car stops and relief to the extent necessary from gross income tax and assessments in street paving projects.

The company, in its petition, also says it will agree to try any reasonable plan that may be advanced.

Council has no authority to grant an increase in fares, or in any way to grant revisions in the operation of the various lines. This power rests entirely with the Georgia Public Service Commission. The city can, however, grant the request that jitneys be eliminated from competition with street cars and grant relief from gross income tax and paving assessments.

"Owl" Cars for New Year's Frolickers.

—So that no one would miss the New Year in and the old year out in Denver, the Denver Tramway ran an extra "Owl" car on every line where it does not operate all-night service, thus making it possible for those who were not participators in the automobile jam-boree to linger a while longer and still get home with ease, comfort and safety.

Condition Placed on Operation of One-Man Cars.—The Johnstown Traction Company, Johnstown, Pa., has secured permission to operate one-man cars over grade crossings "provided the company places a watchman at the crossings," according to a decision handed down by the Public Service Commission. The railway appealed to the commission for approval of the waiver of a general order relating to the operation of cars crossing at grade over steam railroads. With two-man cars the conductor is required to "flag" the motor-man to proceed. The traction company sought to eliminate the "flagging" with one-man cars, allowing the operator to remain on the car.

Will Work Uniform Fare Collection System.—E. M. Walker, president of the Schenectady Railway, recently announced that a movement was being undertaken to work out a uniform fare collection system. At the present time part of the cars are operated on the pay-enter plan, while on others the

patron pays when he leaves the car. So as to prevent confusion in boarding the right car the Schenectady Railway has adopted the system of painting large yellow strips along the center of the interurban coach roofs to distinguish them from the city cars. It is said that the resemblance of some of the Albany service cars and the "submarine" type cars used on city lines causes confusion when seen at a distance. Many of the old interurban cars now used in rush-hour city service are taken for Albany or Troy coaches. According to General Manager Lynch, the system will enable the passengers to identify the cars right away. It is said that the Fonda, Johnstown & Gloversville Railroad will mark its cars in the same way.

Order Does Not Apply to Suburban Trains.—The Missouri Public Service Commission has modified a recent order requiring railroads and interurban lines to furnish drinking cups on all trains operated in Missouri so that this edict will not apply strictly to suburban trains. The modification was made at the request of the St. Louis & San Francisco Railway which sought to be relieved of the necessity of furnishing cups for the suburban trains operated between Pacific, Mo., and St. Louis. The commission stated that the original order was not intended to apply to suburban trains.

Ordinance Effective Shortly.—The jitney ordinance passed by the City Commission of Mobile, Ala., on Dec. 27 and referred to in the *ELECTRIC RAILWAY JOURNAL* of Jan. 5, becomes effective Jan. 15. Its provisions practically eliminate jitneys from the streets of Mobile. Only three jitney buses had been operating in the city of Mobile and they were losing money but it was found that they took about \$2,500 a month away from the Mobile Light & Railroad Company.

Bus Lines Included in Merger.—The Northern Indiana Railway, operating in South Bend, Ind., has absorbed the Lee bus lines and will make them a part of the transportation system by running them into districts built up during the last three years of industrial expansion. The bus lines to Cassopolis and Dowagiac, Mich., were included in the merger.

Will Apply for Six-Cent Rate.—The Binghamton Railway, Binghamton, N. Y., will make application to the Common Council on Jan. 15 for the right to charge a 6-cent fare within the city limits during the year 1924. This privilege has been granted the company for the past three years. Company officials have presented figures each year for the past three years which they claim show that if a 5-cent fare were charged the company would have to suspend operation of its cars.

Exhibit Shows Accidents.—As a further step in Salt Lake City's safety first campaign, an exhibit of miniature vehicles showing how accidents happen was recently placed in the window of

the Utah Power & Light Company. The display showed an intersection of a busy street, with two automobiles colliding and street cars striking a pedestrian, an automobile and an ice wagon. At one side of the miniature vehicles a graveyard was depicted with tombstones bearing among other inscriptions the following: "Gasoline and Moonshine Don't Mix," "Speed Hound," "Reckless Driving," etc. The city recently began its safety first campaign by arranging for the blowing of whistles at 3:30 o'clock each school afternoon, to warn automobile drivers that schools are being dismissed.

Special Ticket Rates.—The Cedar Rapids & Iowa City Railway & Light Company, Cedar Rapids, Ia., has started the sale of special round trip rates on all its service from 5.30 p.m. to midnight. The round trip ticket for use between these hours can be bought for the prices that are ordinarily charged for a one-way fare.

Higher Fares in Effect.—Fares were recently increased on the lines of the United Electric Railways, Providence, R. I., by reducing the number of tokens to be sold for 50 cents from ten to nine. According to President Potter the new tariff will yield an additional net revenue estimated at \$422,500, an amount sufficient to offset the estimated operating deficit of \$412,495 for 1924. The present tariff schedule was filed on Nov. 22 and became effective on Nov. 24, and the thirty days required by law ended on Dec. 24. The company's application for increased rates has been referred to previously in the *Electric Railway Journal*.

One-Man Cars Exclusively in Oklahoma City.—The one-man car has come into general use in Oklahoma City. All the lines there are so equipped exclusively. The change to one-man operation has come about gradually. It was made effective on the last lines in the city on Christmas Day. The last remaining lines to be changed over were the Capitol, the Capitol Hill and the Culberson lines.

9,974 Cars of Livestock Handled in Eleven Months.—A statistical report covering both inbound and outbound business handled by the Belt Railroad & Stock Yards Company, made public by C. C. Holstein, traffic manager of the company, shows plainly the steady growth of the interurban as a freight carrier. The report covers the eleven months ended Nov. 30, last. It reveals a total of 9,974 car loads of livestock handled by all the large interurbans that serve the Indianapolis market. During the eleven months period ended Nov. 30, the number of cars of live stock transported by the principal interurbans to Indianapolis was distributed as follows: Terre Haute, Indianapolis & Eastern, 5,529; Indianapolis & Cincinnati, 1,409; Union Traction Company of Indiana, 1,541; Interstate Public Service Company, 706, a total of 9,185 cars.

Personal Items

Operating Staff Promotions

Roy R. Hadsell Made General Superintendent at Rochester—B. C. Amesbury Promoted

Roy R. Hadsell, for the past six years superintendent of the Rochester lines of the New York State Railways, has been promoted to general superintendent of the company's lines in that city and vicinity. The company's interurban lines from Rochester will now be under Mr. Hadsell's supervision.

B. C. Amesbury, assistant superintendent of city lines under Mr. Hadsell, succeeds to the post vacated by his chief. Both officials have served in virtually all departments of the railway system. The appointments were announced Jan. 4 by James F. Hamilton, president of the company.



R. R. Hadsell

Mr. Hadsell became identified with the International Railway at Buffalo in 1900 as a conductor. He remained with that company in various capacities until 1903, when he left Buffalo to enter the service of the Schenectady Railway as chief inspector. Here he stayed until 1913, when he resigned to become superintendent of the Troy division of the United Traction Company of Troy, N. Y. It was in February, 1917, that he resigned from that company to become assistant superintendent of the New York State Railways at Rochester. In the fall of 1918 he was appointed superintendent of the Rochester lines, succeeding E. E. Strong, resigned.

Mr. Amesbury, the new superintendent at Rochester, has been an employee of the New York State Railways for more than thirty years, beginning his railway career as a driver of horse cars in Rochester. In his early days with the company he served as a motorman and inspector, and in 1900 became general foreman of construction of the Rochester & Sodus Bay Railway, which was then under construction. When the road was opened for operation in

the fall of that year he was appointed roadmaster of the company, and continued in that position until 1906. He was then made superintendent and held that position until the consolidation of the Rochester Railway, Rochester & Eastern Rapid Railway, Rochester & Sodus Bay Railway and other properties into the New York State Railways. When the consolidation took place he was appointed division superintendent at Rochester, in which capacity he continued up to 1918, when he was made assistant superintendent.

E. A. Robert, president of the Montreal Tramways & Power Company, Montreal, Que., since its inception about fourteen years ago, has resigned from the board. The company controls the Montreal Tramways, of which Mr. Robert continues as head.

William C. Finley, formerly vice-president of the Montreal Tramways & Power Company, Montreal, Que., has been elected president of the company, to succeed E. A. Robert.

Robert J. Fleming, formerly general manager of the Toronto Railway, Toronto, Ont., has been elected president to succeed the late Sir William Mackenzie. The company is being liquidated as a result of the purchase of the property by the city.

Howard Ansley has been appointed manager of the securities department of the Tennessee Electric Power Company, Chattanooga, Tenn. He is a well-known employee of the Nashville Railway & Light Company, going to that concern in 1913 in the lighting and sales department. He has been employed by that company since that time.

Elmer Oswald, formerly transit man in the engineering department of the New York State Railways, has recently accepted a position as assistant engineer with the Schenectady Railway. He first became identified with the New York State Railways in 1919 as material clerk in the track office and two years later he was given a position in the engineering department as rodman.

M. H. Frank, formerly in charge of the electric railway, light and power and gas properties of the Eastern Wisconsin Electric Company at Fond du Lac, Wis., has been named to succeed B. W. Arnold as manager of the electric railway department of the company. Mr. Arnold, as noted previously in the *ELECTRIC RAILWAY JOURNAL*, has joined the forces of the Chicago, North Shore & Milwaukee Railroad.

R. C. Larkin has been appointed superintendent of interurban divisions of the International Railway, Buffalo, it was announced on Jan. 1 by Herbert G. Tulley, president of the company. Mr. Larkin will have supervision over

the Buffalo-Niagara Falls high-speed line, Buffalo & Lockport, Lockport & Olcott and Buffalo & Lancaster divisions, in addition to the Park & River route along the Canadian gorge. Mr. Larkin was formerly with the Philadelphia Rapid Transit Company for several years as operating manager of the Folsom division, an interurban section of the P. R. T. Mr. Larkin will make his headquarters in the Niagara Falls terminal. This is a new position created by President Tulley.

G. O. Nicolai General Manager at Terre Haute

G. O. Nicolai, whose appointment as general manager of the Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company, was referred to in the *ELECTRIC RAILWAY JOURNAL*, issue of Jan. 5, has been in the employ of the company for more than twenty years. He has risen to the managership of the property by promotions through various positions, beginning as a clerk in the purchasing de-



G. O. Nicolai

partment in March, 1903. He was later transferred to the light and power department, shortly after becoming chief clerk. He then advanced to the position of commercial agent, to be followed by a still greater promotion, that of superintendent of the light and power department, and has occupied that position up to the present time. His present appointment became effective on Jan. 1. Mr. Nicolai was born in August, 1883. He was educated in the Terre Haute public, high and commercial schools.

In a statement he said that there would be no great change made in the policy, the only change being to fill the position he was leaving. Mr. Nicolai succeeds as manager of the company Edwin M. Walker, who recently became president of the Schenectady Railway.

Alcide E. Beauvais has been elected an additional vice-president of the Montreal Tramways & Power Company, Montreal, Que. He is a member of the Montreal Stock Exchange house of Fortier, Beauvais & Company.

Messrs. Enright, Metzger and Ryan in New Posts

Joseph M. Enright, superintendent of way and structures of the Community Traction Company, Toledo, has been appointed to the Toledo Edison Company with the title of assistant to Vice-President B. C. Adams. In his new position it is understood that he will have charge of the Toledo, Ottawa Beach & Northern Railway and do considerable public relations work directly under Mr. Adams. He will also be connected with a number of other Doherty properties at Toledo under the new arrangement. Mr. Enright began his railway career as a driver of horse cars in Toledo thirty-five years ago. He was at one time superintendent of transportation, holding this post directly after the starting of the service-at-cost plan.

General Superintendent J. Frank Johnson will assume the duties for the time being that Mr. Enright had in the Community Traction Company.

R. S. Metzger, with the Doherty properties at Toledo for a number of years, and in charge of the Toledo, Ottawa Beach & Northern line, has been named assistant claims attorney for the Community Traction Company.

James Ryan has been transferred to the Toledo Edison Company to handle claims of the other Doherty properties at Toledo. He has been handling claims for the railway for years. All the changes were effective with the New Year.

C. S. Mitchell Vice-President of Philadelphia Company

Curtis S. Mitchell has been made vice-president and controller of the Philadelphia Company and affiliated companies, among them the Pittsburgh Railways, with headquarters in the Central Office Building, Pittsburgh. In addition to handling the responsibilities of controller he will perform such other duties as may be assigned by the president.

Mr. Mitchell entered the auditing department of the United Traction Company of Pittsburgh in August, 1897. Two years later control of the road was purchased by the Philadelphia Company, which in 1902 acquired all the surface railways in Pittsburgh. At that time Mr. Mitchell was appointed auditor of the combined property and continued in that position until 1912, when he became controller of the company. Mr. Mitchell has been very active in American Electric Railway Association affairs, at one time holding the position of third vice-president and at another president of the Accountants' Association.

J. J. Connors has been appointed safety supervisor of the Nashville Railway & Light Company, Nashville, Tenn. He was formerly carhouse foreman with that company.

A. V. Little has been named superintendent of the Southern Cambria Railway, operating in Ebensburg, Cone-maugh, South Fork, Brookdale and Mineral Point, Pa.

E. B. Moore, general manager of the Monongahela Power & Railway Company, Fairmont, W. Va., has resigned. Mr. Moore has been with the traction company as general manager since 1915, joining the company after serving as chief engineer for the Consolidation Coal Company.

Obituary

Cecil G. Rice

Cecil G. Rice, superintendent of the claims department of the Pittsburgh Railways and former manager of the associated bureaus of that company, died on Jan. 3. Mr. Rice succumbed to pneumonia after an illness of about six weeks.

Mr. Rice had done noted claims work in the electric railway field. He re-organized that department of the Pittsburgh Railways into bureaus of clerical, inspection, medical, adjustment, and litigation. At the head of each bureau is a chief, and over all the bureaus Mr. Rice exercised an uncanny knowledge of human beings in an antagonistic mood and bent upon winning a fat fortune for a bruise. This knowledge was a mixture of psychology, law and finance, with a generous share of honest liking of the other fellow, which made the enemy a friend once he stepped inside Mr. Rice's private office. Mr. Rice's work really was nothing but making enemies into friends. His humor and his sense of fair play, too, disarmed any "principal" (never called the "claimant" by the Pittsburgh Railways) for a grouch can't survive near humor and justice. Cartoons of the absurdity of litigation are scattered about the office, attesting to Mr. Rice's humor, and the Code of Ethics and Policies formulated and published by Mr. Rice emphasizes the fixed principle of dealing with justice to all concerned. The plan of the claims department, which is based upon psychological principles, was described in the *ELECTRIC RAILWAY JOURNAL*, issues of July 24 and Sept. 11, 1915.

Mr. Rice had contributed frequently to the *ELECTRIC RAILWAY JOURNAL*, and gave the benefit of his constructive ideas to this paper in an interview which appeared in the issue of July 22, 1922, page 113. He had had considerable newspaper experience as city editor of the Parkersburg (Pa.) *Daily News*, and on the staff of a Pittsburgh paper. This work in Pittsburgh led to his appointment to do special work for the city. In 1907 he became associated with J. D. Callery, president of the Pittsburgh Railways, as his private secretary, and later was made general agent of the company in charge of the employment bureau. From

1908 to 1909 he was credit manager of the Colonial Trust Company, Pittsburgh, but returned to the Pittsburgh traction system as head of the claims department. He was in charge of the same work for the Duquesne Light Company and the Beaver Valley Traction Company. In 1915 Mr. Rice was appointed assistant to the president, continuing in charge of the claims work as manager of the associated bureaus. In 1921-1922 he was president of the American Electric Railway Claims Association.

A. W. Damon

Alonzo Willard Damon, vice-president and director of the Springfield Street Railway and a trustee of the New England Security & Investment Company, died in Springfield, Mass., on Jan. 7, at the age of seventy-six years. On leaving school Mr. Damon became a clerk for the Washington Insurance Company in Boston. He subsequently filled important positions for this and other companies, and in 1895 became president of the Springfield Fire & Marine Insurance Company, an office that he filled with marked ability until his death. He was also a director of the Third National Bank, Springfield. His service on the board of the Springfield Street Railway reached back many years, and his counsel was recognized as of great value.

Walter R. Dame, widely known in New England as a corporation lawyer and promoter of electric railway and other utilities in central Massachusetts and Vermont, died recently at Daytona, Fla., at the age of sixty-three.

Charles R. Dougherty, for the past three years working in the financial interests of the General Electric Company on the Pacific coast, died recently at his home in Pasadena, Cal., at the age of fifty-one. Mr. Dougherty began his business career when seventeen years of age with the Thomson-Houston Electric Company in Philadelphia, in a clerical capacity. In 1894 he was made auditor of the Philadelphia District of the General Electric Company. In 1913 he was transferred to Schenectady as a general assistant to the controller of the company.

John T. Murphy, superintendent of the Chicago Heights Street Railway for the past eighteen years, was killed recently in an automobile accident. He had devoted his entire life to street railway work, including construction and operation. During his residence in the city of Chicago Heights he had become one of its prominent citizens. When the city of Chicago Heights adopted the commission form of government, Mr. Murphy was elected a commissioner, serving two years, and retiring from this office only a few months prior to his death. Robert Johnson has succeeded him in the capacity of superintendent of the Chicago Heights Street Railway.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Ticket Sales Increase

Manufacturer Reports 35 per Cent Increase in Output for the Year Just Ended

Sales of the Globe Ticket Company, Philadelphia, Pa., in 1923 were 35 per cent greater than in 1922. Moreover, the company reports the outlook for 1924 to be exceedingly bright. It has as usual been planning ahead, and is prepared to meet any demands that may be made upon its facilities. In fact, the birth of the new year was very appropriately celebrated on Jan. 1 by the company with a reception held in its factory on North Twelfth Street. The occasion marked the formal opening of the new section of the plant, which, with the completion of some alterations to be made in the older section, will more than triple the size of the factory.

The normal capacity of the Globe plant is about 25,000,000 to 30,000,000 tickets a day. Under pressure this output can be increased to more than 40,000,000 daily. The tickets produced include every known form of ticket or check, from the familiar trolley ticket and transfer to the elaborate dining-room check used in fashionable hotels, restaurants and clubs. The sales of the company are not confined to this country. Nearly every country in the world where movies are shown or trolleys are operated makes use of Globe tickets and transfers.

In addition to the Philadelphia plant, a complete unit is maintained in Los Angeles to serve the Far West, and a similar unit in New York City handles the work for the Metropolitan area.

Lumber Production Increased 20 per Cent Last Year

Lumber production during 1923 of the mills reporting to the National Lumber Manufacturers' Association showed an increase of 15 per cent over the production in 1922. This figure is based on actual reports for fifty-one weeks and an estimate for the last week of the year. In 1922 the lumber cut by 13,163 mills, representing about 90 per cent of the total for the country, was 31,426,922,000 ft., according to the United States Forest Service. The lumber production of the country in 1923 is estimated at over 38,000,000,000 b.ft.

The greatest increase in production is in the Pacific Northwest, a gain of about 20 per cent over the preceding year being reported by the mills of the West Coast Lumbermen's Association. The Southern Pine Association reports a similar increase. There were

also notable increases in production in other regions, the Northern Pine Manufacturers' Association stating that the lumber cut in 1923 would probably exceed that cut in 1922 by about 14½ per cent. The Western Pine Manufacturers' Association and the Hardware Manufacturers' Association also report large increases.

Cement Prices Relatively Low Despite Large Demands

During a period of extraordinary demand throughout almost the entire year just ended, cement production and shipments exceeded all former records. At the same time manufacturers' stocks were maintained to such an extent that in the latter part of the year portland cement available at the mills was about 30 per cent in excess of that on hand at the same time the year before. In the first eleven months of 1923 production of portland cement amounted to approximately 127,000,000 bbl. This was an increase of 12,000,000 bbl., or about 20 per cent, over the production during the entire year of 1922. The accompanying table, based upon the reports of the United States Geological Survey, shows the production of portland cement since 1916:

	Production
1923*.....	126,969,000
1922.....	114,790,000
1921.....	98,842,049
1920.....	100,023,245
1919.....	80,777,935
1918.....	71,081,663
1917.....	92,814,202
1916.....	91,521,198

*Eleven months.

It is felt by cement manufacturers that prices have been and are still relatively low. Reports of the Bureau of Labor show that cement prices never reached the peak of other commodity prices and are still below the average of the building material group. There has been a slight decline in the prices of portland cement during the latter part of 1923, although it has not yet reached the low level of the early part of 1922.

Construction of Houston Line in Near Future

According to information received from the company, the Houston, Beaumont & Orange Interurban Line, Houston, Tex., is just about ready to start construction. The line has 110 miles of right-of-way ready to be surveyed. The bonds for this road have been sold to Thayer & Son of Washington, D. C. The officers of the company are George Collier, president; J. C. Simmons, secretary, and Ed Kennedy, general manager.

Half-Million-Dollar Order for Equipment

The General Electric Company has received an order amounting to \$500,000 for complete electrical equipment of fifty new all-steel high-speed interurban electric passenger cars to be used by the Pacific Electric Railway on its Pasadena line.

Block Signals Purchased for Use in Davenport

Sixteen automatic block signals have been purchased by the Tri-City Railway for installation in Davenport. They are of the Nachod automatic type, and will be installed on passing sidings on single-track lines. Eight blocks just installed on the Northwest Davenport and Rockingham lines were used recently for the first time. The others will be installed and placed in operation within the next thirty days. These automatic signals replace old manual signals.

Soft Coal Production Decreases

The weekly tonnage of bituminous coal production during December, 1923, was considerably lower than at any other time during the year. The lowest week was that ending Dec. 29, when only 6,684,000 tons were mined. In only one week during the month did the amount exceed 10,000,000 tons, whereas during the first three quarters of the year it averaged more than that amount.

In every week of October and November, the week ended Nov. 17 excepted, the bituminous production was over 10,000,000 tons.

No comparison with soft coal production in 1922 is worth anything on account of the strike that year. The average for 1923, however, compares well with that of previous years in spite of low production during December. In 1923 the weekly tonnage did not average more than 8,000,000 tons, in 1920 slightly more than 10,000,000 tons, in 1919 about 8,800,000 and in 1913, which may be taken as the criterion of normal production, it was 9,200,000 tons.

Metal, Coal and Material Prices

Metals—New York		Jan. 8, 1924
Copper, electrolytic, cents per lb.....		12.75
Copper wire base, cents per lb.....		15.50
Lead, cents per lb.....		7.90
Zinc, cents per lb.....		6.87
Tin, Straits, cents per lb.....		48.00
Bituminous Coal, f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.....		\$4 675
Somerset mine run, Boston, net tons.....		2.125
Pittsburgh mine run, Pittsburgh, net tons.....		2.00
Franklin, Ill., screenings, Chicago, net tons.....		2.075
Central, Ill., screenings, Chicago, net tons.....		1.75
Kansas screenings, Kansas City, net tons.....		2.00

Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.....		\$6.65
Weatherproof wire base, N. Y., cents per lb.....		17.50
Cement, Chicago net prices, without bags.....		\$2.10
Linseed oil (5-bbl. lots), N. Y., per gal.....		\$0.94
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots.....		11.50
Turpentine, (bbl. lots), N. Y., per gal.....		\$1.04

Rolling Stock

Madison Railways, Madison, Wis., has been authorized to procure twelve more one-man cars, some of which may be added during the next few months.

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Date order was placed.....	Dec. 29, 1923
Date of delivery.....	March 15-31, 1924
Type of car.....	Passenger motor
Seating capacity.....	44
Total weight.....	32,500 lb.
Length over all.....	41 ft. 4 in.
Truck wheelbase.....	5 ft. 4 in.
Width over all.....	8 ft. 5 in.
Height, rail to trolley base.....	10 ft. 3 in.
Body.....	Steel
Interior trim.....	Cherry
Headlining.....	Agasote
Roof.....	Arch
Air brakes.....	G.E. CP-27B
Axles.....	A.S.T.M. Spec. A 20-21
Car signal system.....	Consolidated Buzzer
Car trimmings.....	Bronze
Control.....	K-35 double end
Curtain fixtures.....	
Curtain Supply or National Lock Washer	
Curtain material.....	Pantasote
Destination signs.....	Hunter
Door operating mechanism.....	
G.E. Safety Car Devices Company	
Fenders.....	H. B. Life guards
Hand brakes.....	Brill
Heater equipment.....	Consolidated
Headlights.....	Golden Glow SM 95
Motors.....	Four G.E. 265
Seats.....	Brill Winner
Seating material.....	Wood slats
Step treads.....	Feralun
Trolley catchers.....	Earl
Trolley base.....	Simplex
Ventilators.....	Brill
Wheels.....	27 in. rolled steel
Lighting fixtures.....	
Compensating Type, 5 to the car in center	

Track and Line

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"Choked to death"
—with chain!

That's why the inadequate hand brake wouldn't stop the car! A few turns of the handle, and the brake was jammed. Slack and worn brake shoes left so much loose chain that the brake couldn't handle it.

**But it wasn't a Peacock
Staffless!**



PEACOCK

STAFFLESS BRAKES

will never choke with chain

—because they wind the chain over a drum and drop it down into the ample space below inside the capacious steel housing. Any amount even up to 144 inches can be taken care of. This is more than sufficient to meet the worst possible conditions. Peacock Staffless Brakes will never choke to death on chain.

How much chain will your hand brakes take?

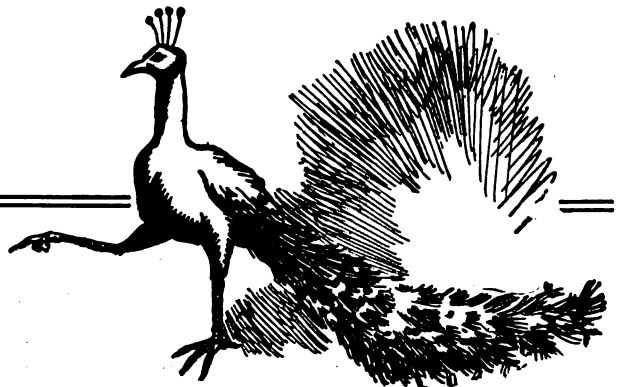
Investigate brake capacity!

It's worth looking into before some accident compels your attention.

NATIONAL BRAKE COMPANY, Inc.

890 Ellicott Square
Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Montreal, Can.



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Originator of unlimited ride, transferable weekly
pass. Campaigns handled to make it a success.

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Industry read the

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Every Week

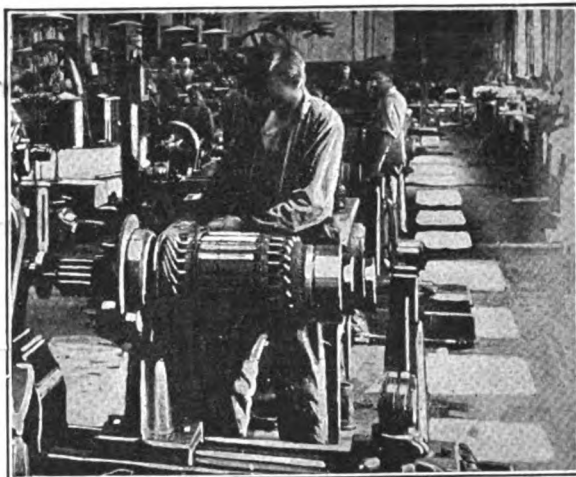
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Utilities of All Kinds

Traffic and Operating Studies

Allison Bldg.

Richmond, Va.

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Corporation**

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New York

Tacoma

**Transmission Line and Special Crossing
Structures, Catenary Bridges**

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ARCHBOLD-BRADY CO.

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The Most Successful Men in the Electric Railway
Industry read the**ELECTRIC RAILWAY JOURNAL**

Every Week

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DETECTIVES131 State St.
BOSTONWhen writing the advertiser for information or
prices, a mention of the Electric Railway
Journal would be appreciated.

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It's a simple thing to lay down a piece of combination slot insulation (cut to specification) and insert the coil or coils. Irvington slot insulation is made up of a layer of varnished cambric and a layer of fibrous paper solidly cemented together with a flexible insulating compound that will not dry out.

And the Seamless Bias tape is a big time- and labor- and material-saver as compared with the old type of sewed bias.

Place a trial order of both.

Sign that requisition now.

Irvington Products

Varnished Silk
Varnished Paper
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Straight and Bias Varnished Cambric
Tapes
Flexib'e Varnished Tubing
Special Folded Paper for Coil
Windings

Transformer Leads
"Cellulak"
Special Adhesive
High Dielectric Paper
Insulating Varnishes and
Compounds
"Irv-O-Slot" Insulation

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.

Established 1905

Sales Representatives:

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T. C. White Electrical Supply Co., St. Louis
E. M. Wolcott, Rochester
L. L. Fleig & Co., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles
F. G. Scofield, Toronto

“A”ssuring “B”etter “C”ontact

AN A. B. C. report is a businesslike, deciding authority that has replaced the old custom of buying space on certain “claims” of the publisher.

The publisher with space to sell submits the facts about his business in the form of a statement to the Audit Bureau of Circulations. This statement after it is checked, approved or audited by the Bureau is used to place the publisher’s wares before the Advertiser who is buying space.

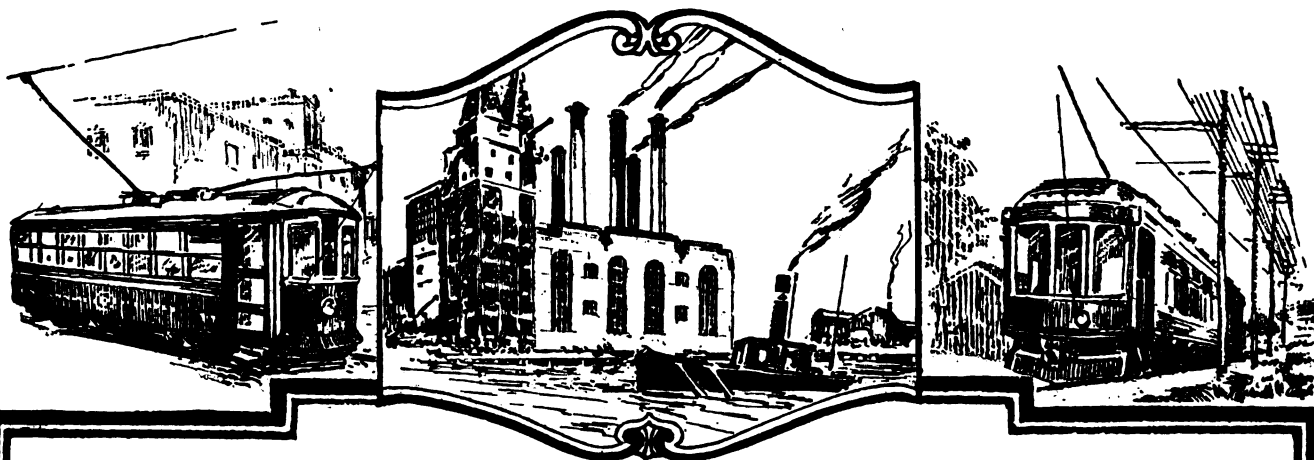
The Advertiser knowing the thoroughness of A. B. C. methods safely bases his decision on the Verified Facts contained in the A. B. C. report.

The Audit Bureau of Circulations has brought together the Buyer and Seller of Space upon a basis of Mutual Confidence.

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Study the latest A. B. C. report of the Electric Railway Journal before placing your advertising. A copy will be furnished on request.

(WRITE TO THE AUDIT BUREAU OF CIRCULATIONS, 202 SOUTH STATE STREET, CHICAGO, FOR A COPY OF “THE MEASURE OF YOUR MESSAGE”)



Initiative *plus*

Whenever Street Railway men foregather to talk shop, listen in. Especially when they talk about lubrication.

You will hear some convincingly good things about Texaco Service, about our rapid rise to leadership and about the Initiative displayed in Texaco policies and Texaco Engineering.

Initiative is there—and is largely responsible for the measure of success we have obtained.

That Initiative rests on a firm foundation made up of other qualities visible in every Texaco transaction and throughout all Texaco practices in the Recommendation, Application, and Delivery of correct lubricants for Street Railways.

For example, underlying every Texaco Contract are the stability and resources of a huge, well-knit, progressive, complete organization engaged in the Production and Manufacture of all manner of Petroleum Products and in their Distribution all over the world.

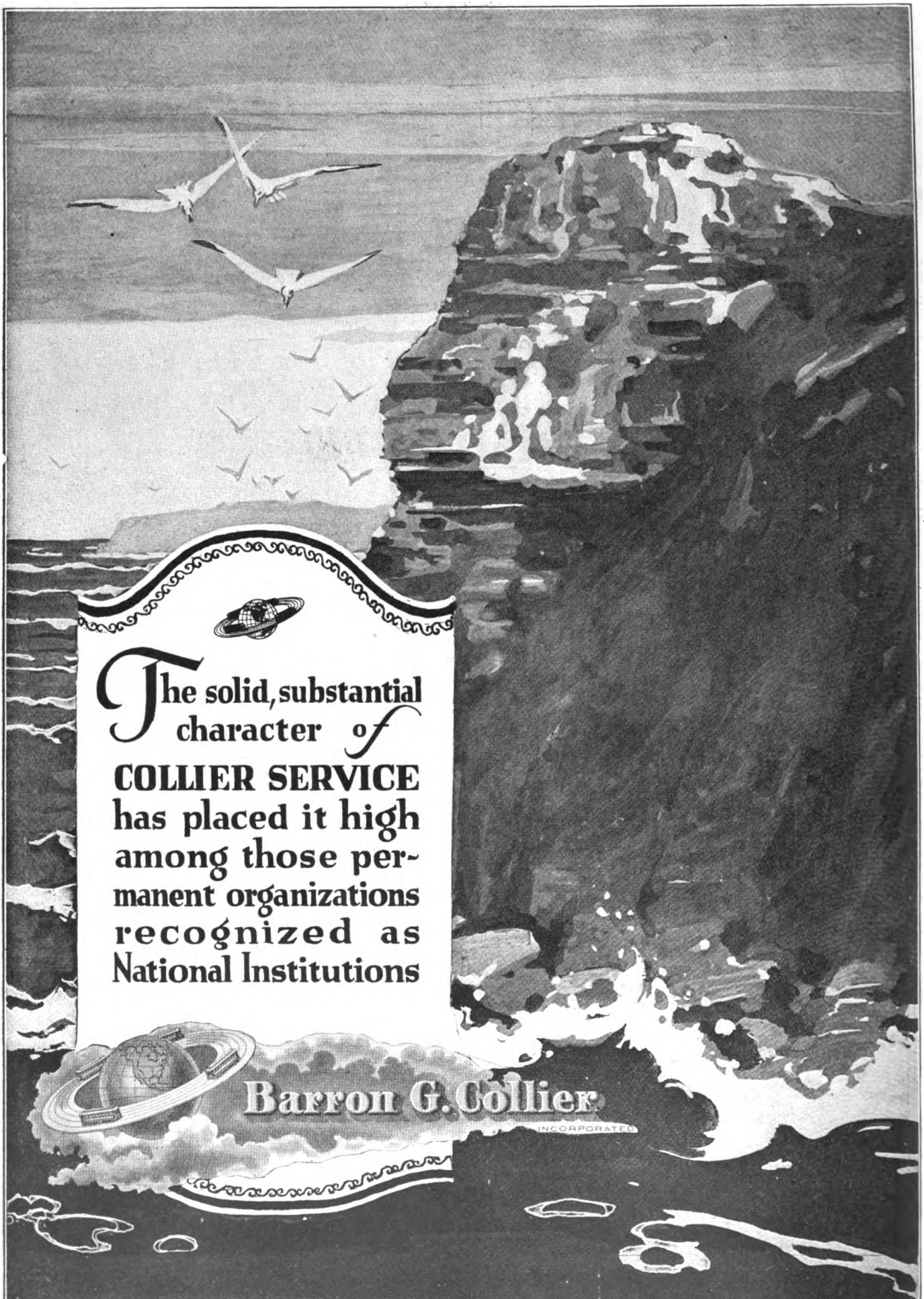
And supporting every specific recommendation of Texaco Engineers is a vast fund of technical information gleaned from the successful lubrication of every type and kind of mechanical unit in every branch of Industry.

All this is concentrated and passed on to you when your Road joins the host of Street Railways of America who are operating hundreds of millions of car miles with Texaco Lubricants.

There is a Texaco Lubricant for Every Street Railway Purpose

When would you like to have a Texaco Engineer tell YOU how they serve?



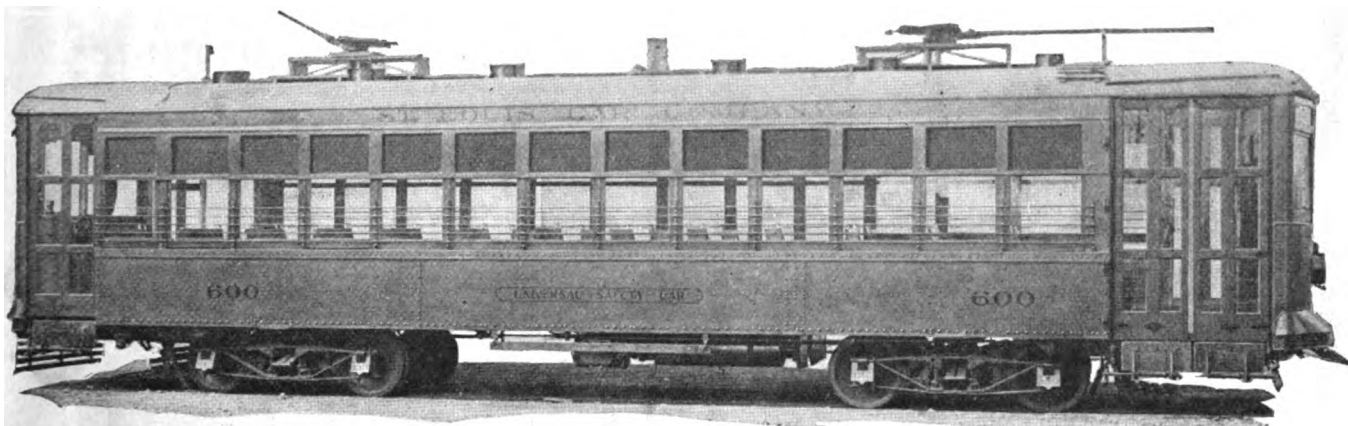


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COLLIER SERVICE
has placed it high
among those per-
manent organizations
recognized as
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INCORPORATED





"UNIVERSAL" SAFETY CARS

Specifications

General Dimensions

Length over all.....	42 ft. 5 1/4 in.
Length over vestibule sheath- ing	41 ft. 2 1/4 in.
Width over all.....	8 ft. 4 1/4 in.
From rail to top of floor.....	2 ft. 7 1/4 in.
From rail to top of roof.....	10 ft. 1/4 in.
Truck centers	21 ft.

Trucks

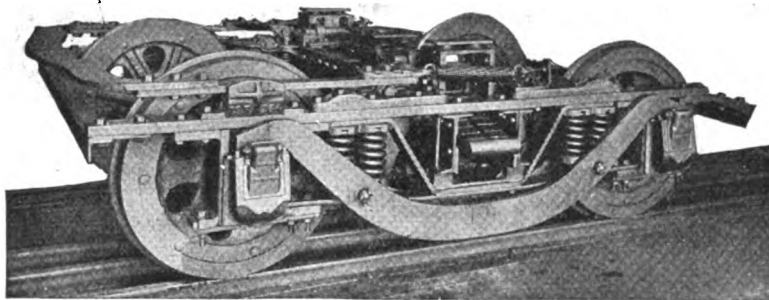
St. Louis Car Co. Am. 64 Type with chrome nickel steel heat-treated arch bars. Wheel-base 5 ft. 4 in.; wheels 26 in. diam.; journals 3 1/4 in. x 6 in.

Have you a job for a car like this?
If you have, we can furnish from stock

A car of great capacity (54 seats). A car of unusual adaptability (truly "universal"). A car for maximum operating economy (one-man or two-man). And finally, a car of St. Louis Quality throughout. How many do you need?

St. Louis Car Company
St. Louis, Mo.

"The Birthplace of the Safety Car"



Type "AA" Motor Truck

For Heavy High-Speed Electric Railway Service Baldwin Motor Trucks Are Efficient and Economical

This type of Baldwin Improved Motor Truck is specially recommended on long interurban lines, where "limited" or sleeping cars are operated. It is also suitable for use under double-truck electric locomotives.

These trucks permit of easy inspection and repairs, and show low maintenance costs in operation.

Our nearest representative will furnish detailed information upon request.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A.

Cable Address, "Baldwin, Philadelphia"

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How much chain will your hand brakes take?

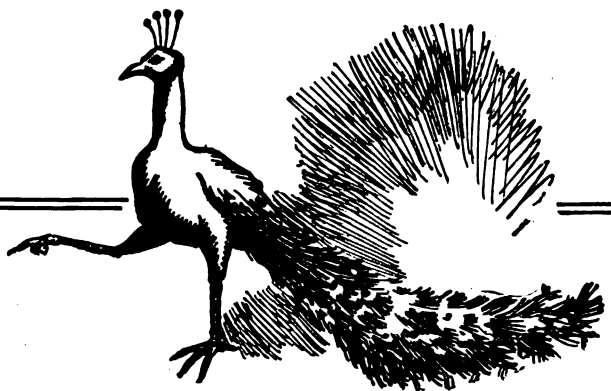
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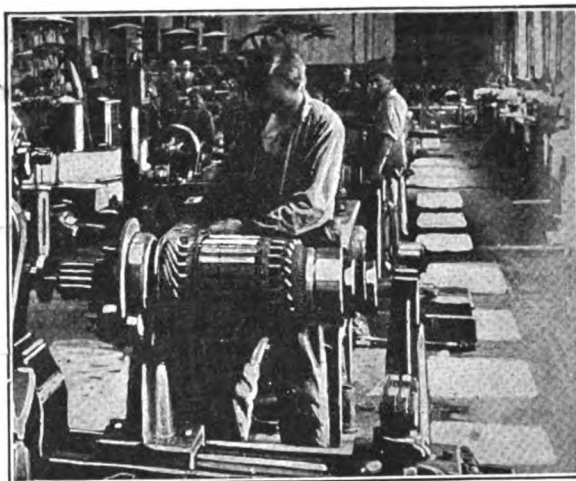
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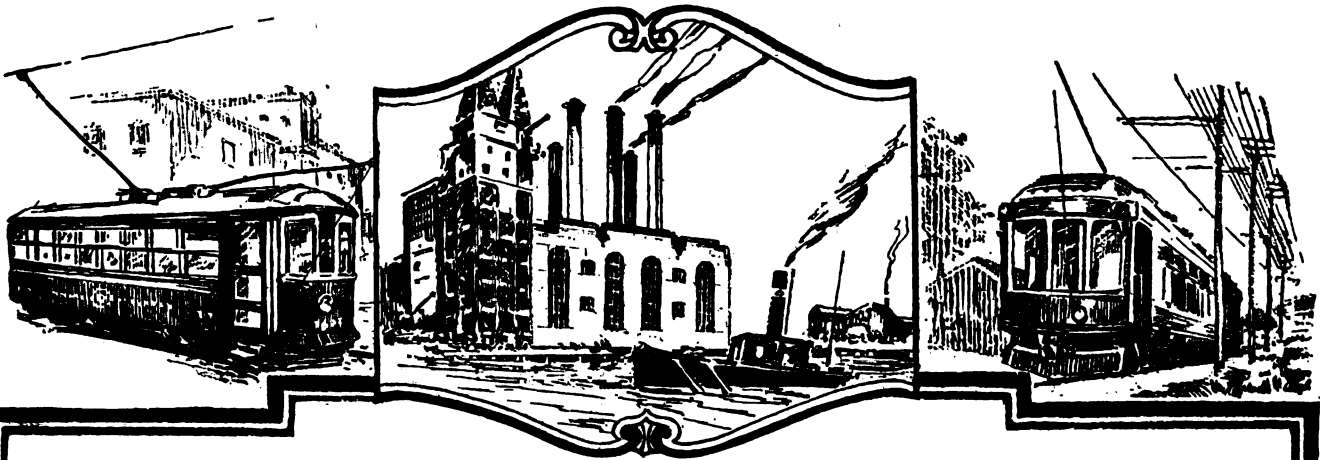
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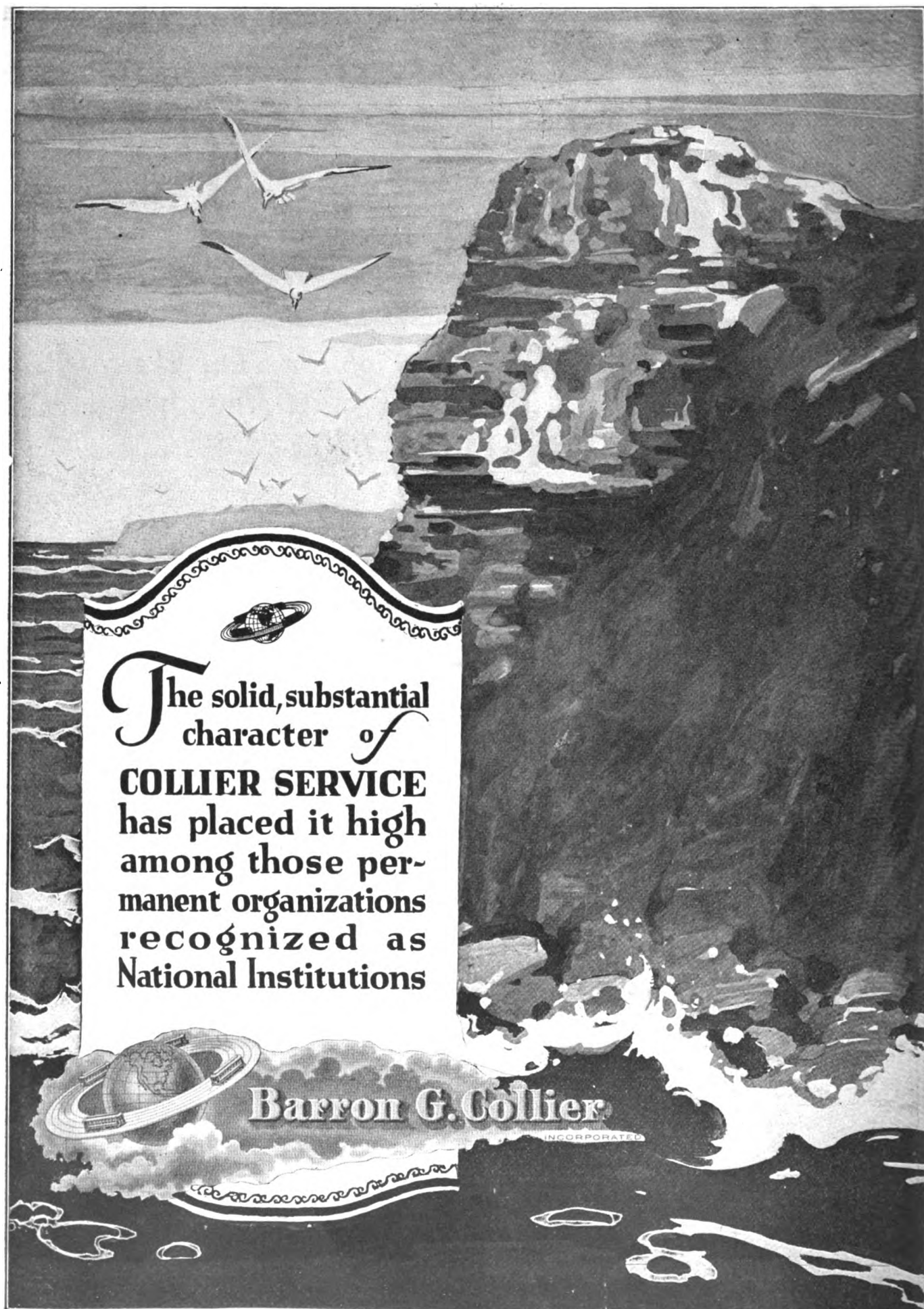
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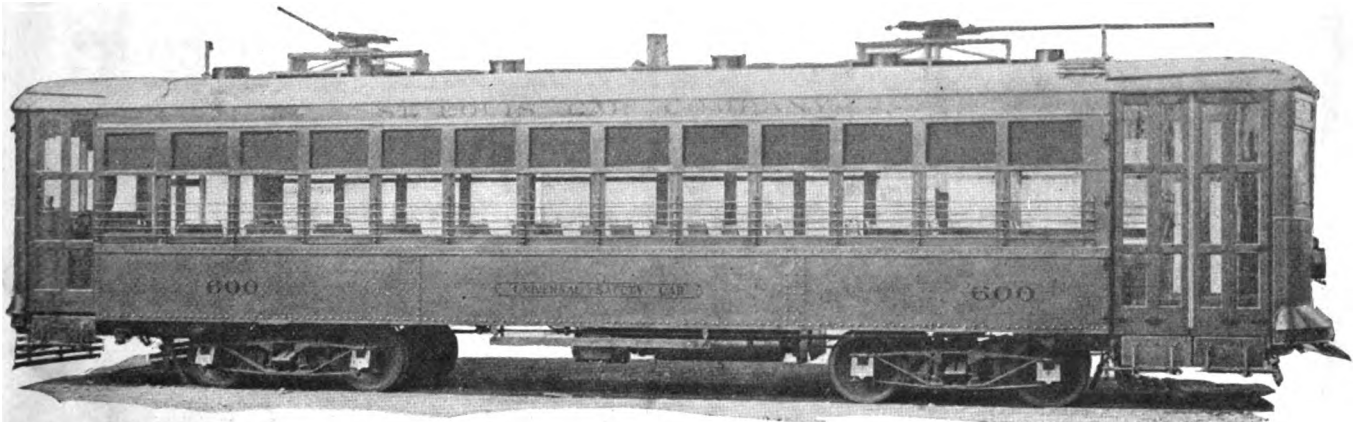
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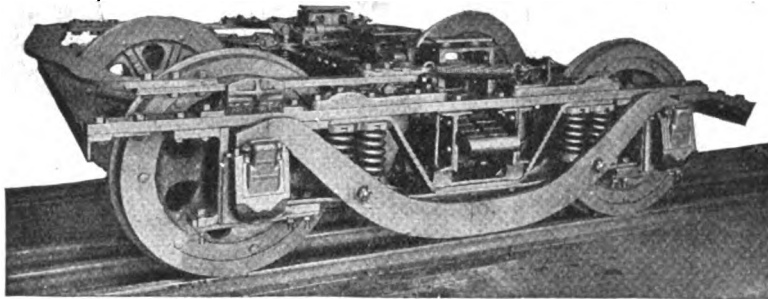
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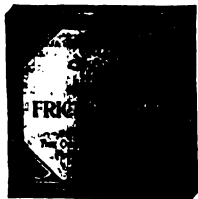
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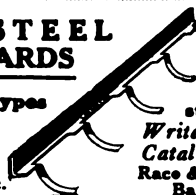
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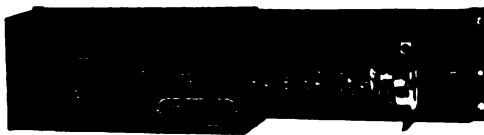
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Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads. (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....\$4.50 an inch
4 to 7 inches.....4.30 an inch
8 to 14 inches.....4.10 an inch
Rates for larger spaces, or yearly rates, on request.
An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.R.J.

POSITIONS WANTED

AUDITOR—Accountant, thirty, fully conversant with the general accounting of public utilities and possessing appreciation of operating details, desires connection. Has demonstrated ability over a broad scope. Highly recommended. PW-640, Elec. Railway Journal, 10th Ave. at 36th St., New York.

CAN you place a technical graduate on your staff in charge of equipment, distribution, traffic and transportation, or as divisional executive? Am 37 years of age, nicely connected with non-operating company but wish to get into actual operation. Have had operation, manufacturing and installation of railway and power. Up for your consideration. PW-636, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

CAR painter wants a position. Is a first-class all around man. Can give recommendations to that effect is desired. PW-639 Elec. Railway Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT of transportation, at present with large property, solicits correspondence with managers that are in the field for a superintendent of wide experience. Capable progressive and recognized as an economical painstaking official. High-grade references. Personal reasons for desiring a change. PW-638, Electric Railway Journal, Leader-News Building, Cleveland, Ohio.

FOR SALE

96—WH-101B2

Railway Motors

TRANSIT EQUIPMENT CO.
501 Fifth Ave., New York

TO HELP YOU

SELL USED EQUIPMENT

"Searchlight" Advertising

G-2

Brooklyn-Manhattan Transit Corporation

85 Clinton Street, Brooklyn, N. Y.

PURCHASING DEPARTMENT

FOR SALE

CAR BODIES

Open and closed car bodies mounted on single trucks

FOR SALE

RAILWAY MOTORS

2—Unused General Electric, type 210-H.
50% of market price.

GEORGE SACHSENMAIER CO.
926 N. Third St., Philadelphia, Pa.

CARBIC LIGHTS

(Absolutely New)

Just a Few Left at Sacrifice Prices
For Quick Disposal

No. 2 Carbic Lights\$25.00
No. 8 Milburn Lights 25.00
Hippodrome Milburn 30.00

Orders filled promptly while they last.

Send for our "Bargain Price Circular"
Listing Hardware, Valves & Fittings, Tools,
Pressure, Gauges, etc.

JONES-McKEE, Inc.
506 Broadway, New York, N. Y.

Good Relaying Rails

Are as Serviceable as New
Rails, with a Big Saving
on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

HYMAN-MICHAELS COMPANY

531 Peoples Gas Bldg., Chicago

OFFICES AND PLANTS AT

St. Louis, Mo. Detroit, Mich.

Pittsburgh, Pa.

1324 Woolworth Bldg., New York City.

San Francisco, Cal. McKees Rocks, Pa.

The "Searchlight Advertising" in this Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

THE BEST PROOF

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable demand for such machinery or services, by its readers, the market place which these advertisements represent could not exist for any length of time.

Are you using the Searchlight Section?

0818

SEARCHLIGHT SECTION

RELAYING RAILS

80 and 90 lb.

Full complement of Angle Bars. Shipment January and February, 1924.

Standard Rail & Steel Co.
905 Planters Bldg., St. Louis, Mo.
Phone Olive 3654

FOR SALE

ELECTRIC LOCOMOTIVE

26-ton Baldwin Westinghouse, all steel, fully equipped, first-class condition, double and single-truck modern light-weight steel cars.

G. T. ABEL,
700 97th St., Woodhaven, N. Y.

FOR SALE

50—G. E. No. 80-A Motors.
50—Controllers, K-28-B; K-12.
35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

Trolley Passenger and Work Cars WILL BE SOLD AT SCRAP PRICES

Nos. 201-202-203-206.

4—45-ft. Interurban and Baggage Cars. Wood body. End entrance. Cane seats. Monitor roof. Motor G. E. 57 quadruple. 2 turn control. Westinghouse K-14. Single end brakes. Compressors National Brake & Electric Co. BB2. Baldwin trucks. 34-in. wheels. 4½ axles. Each..... \$600

No. 204.

1—Interurban Passenger and Baggage Car. Same as above with 5-in. axles. Rebuilt body of steel to window rail. Plush seats..... 750

No. 208

1—Interurban Passenger and Baggage Car. All steel center entrance. 51-ft. All equipment same as No. 201 with exception of control, which is Westinghouse H. L.... 900

No. 207.

1—Interurban Passenger and Baggage Car. All steel center entrance. 31-ft. Motor Westinghouse 306 v. 4 quadruple. Control—Westinghouse H. L. Brakes—Westinghouse with National Brake & Electric Co. Compressor BB2. Baldwin trucks. 34-in. wheels. 5-in. axles..... \$2000

No. 102.

1—Work Car 30-ft. Enclosed cab. Peckham trucks. Electric Equipment same as No. 201..... 500

1—30-ft. Flat Car. Peckham trucks. Each..... 300

1—38-ft. Freight Trailer. 38-ft. Wasson trucks enclosed freight body. Each..... 300

Buffalo Housewrecking & Salvage Co.

BUFFALO, N. Y.

Phone, Filmore, 1856

3000 TONS 70 LB. ASCE

First Class
RELAYING RAILS

With angle Bars.
Also other Weights.
Immediate shipment.

ZELNICKER IN ST. LOUIS

Cars, Locomotives, Piling, Tanks, etc.

ELECTRIC LOCOMOTIVE

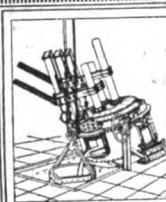
FOR SALE

Standard G. E. 50-ton Locomotive, in first class condition. Locomotive may be seen in daily operation.

ALBANY SOUTHERN R. R. CO.
Rensselaer, N. Y.

'CARNEGIE'
for
**WHEELS
AXLES
RAILS
CROSS TIES**

Carnegie Steel Company
PITTSBURGH, PENNA.



Moore Rapid Section Melt Furnaces
Ten Standard Sizes ½ to 24 Tons Capacity
Most Rapid and efficient for making
Tool Steels, Alloy Steels, Forging Steels
Steel Castings, Malleable Iron, Grey Iron
Carbide, Ferro-Alloys etc.
PITTSBURGH ELECTRIC FURNACE CORPORATION
P.O. Box 1125. PITTSBURGH, PA.



CHILLINGWORTH

One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. Write Us.

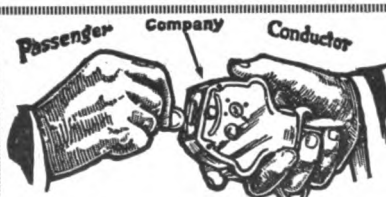
Chillingworth Mfg. Co.
Jersey City, N. J.

Heywood-Wakefield
CAR SEATS

of pressed Steel for all Classes of Passenger Service. Pattern for covering seats and for snow sweepers.

HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.

Office at New York, Chicago, San Francisco



Direct Automatic Registration
By the
Passengers
Rooke Automatic Register Co.
Providence, R. I.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch
Stands
Ramapo Ajax Corp.

Automatic Safety Switch
Stands
Ramapo Ajax Corp.

Autos and Buses
White Co., The

Axles
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Westinghouse E. & M. Co.

Axles, Steel
Carnegie Steel Co.

Babbitt Metal
Ajax Metal Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.,
The

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Brill Co., The J. G.
The General Electric Co.
Gilbert & Sons E. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.

Bearings, Center and Boiler
Side
Baldwin Locomotive Works
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heat'g Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Boilers
Babcock & Wilcox Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms
(See also Poles, Ties,
Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Brakes, Brake Systems and
Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Ry. Appliance Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co., Inc.
U. S. Graphite Co.
Westinghouse E. & M. Co.

Brushes, Graphite
Morganite Brush Co., Inc.
U. S. Graphite Co.

Brush Holders
Anderson Mfg. Co., A. &
J. M.

Brushes, Wire, Pneumatic
Ingersoll-Rand Co.

Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.

Bushings, Case Hardened and
Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Cables. (See Wires and
Cables.)

Cambrie Tapes, Yellow and
Black Varnish
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes,
Carbon)

Cars, Dump
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heat'g Co.
Westinghouse E. & M. Co.

Cars, Passenger, Freight, Ex-
press, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Gas, Rail
Brill Co., J. G., The
St. Louis Car Co.

Cars, Second Hand
Abel, G. T.
Albany Southern R. R. Co.
Buffalo House Wrecking &
Salvage Co.
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
Brill Co., J. G., The
General Electric Co.

Castings, Brass, Composition
or Copper
Anderson Mfg. Co., A. &
J. M.

Castings, Gray Iron and Steel
Bemis Car Truck Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
St. Louis Car Co.

Catchers and Retrievers,
Trolley
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.
Western Electric Co.

Change Carriers
Cleveland Fare Box Co.

Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for
Wires and Cables
Anderson Mfg. Co., A. &
J. M.

Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers Track
(See also Snow-Plows,
Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See
Conveying and Hoisting
Machinery)

Coil Banding and Winding
Machines
Elec. Service Supplies Co.

Coils Armature and Field
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air Portable
Ingersoll-Rand Co.

Condenser Parts
Irvington Varnish & Ins. Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car Heat.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Copper Wire
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebbing's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Cranes
Allis-Chalmers Mfg. Co.
Universal Crane Co.

Cranes, Locomotive
Universal Crane Co.

Cranes, Motor Truck
Universal Crane Co.

Cranes, Portable
Universal Crane Co.

Cranes, Gasoline or Electric
Universal Crane Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.

Crossing, Manganese
Ramapo Ajax Corp.

Crossings
Ramapo Ajax Corp.

Crossings, Track (See Track,
Special Work)

Crossings, Trolley
Ohio Brass Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.

Dealer's Machinery
Brooklyn-Manhattan Transit
Corp.
Elec. Equipment Co.
Jones-McKee, Inc.
Transit Equip. Co.
Zelnicke Supply Co.,
Walter A.

Derailing Devices (See also
Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Co.
St. Louis Car Co.

Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heat'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Ohio Brass Co.

Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebbing's Sons & Co., J. A.
Western Electric Co.

Electric Grinders
Railway Track-work Co.

Electrodes, Carbon
Railway Track-work Co.

Electrodes, Steel
Railway Track-work Co.

Engineers, Consulting, Con-
tracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Lay Corp.
Bylesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Parsons, Klapp, Brinkerhoff
& Douglas
Richey, Albert S.
Sanderson & Porter
Sangster & Co., A.
Stone & Webster
White Eng. Corp., The J. G.
Wortham, Edwin

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Nat'l Ry. Appliance Co.

Fare Registers
Ohmer Fare Register Co.

Fences, Woven Wire and
Fence Posts
Amer. Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flangeway Guards, Steel
Godwin Co., Inc., W. S.

Forgings
Brill Co., J. G., The

Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.

Frogs, Track (See Track
Work)

Frogs, Trolley
Ohio Brass Co.

Furnaces, Elec
Pittsburgh Elec. Furnace
Corp.

Fuses and Fuse Boxes
Consolidated Car Heat'g Co.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Refillable
General Electric Co.

Gaskets
Westinghouse Tr. Br. Co.

Gas-Electric Cars
General Elec. Co.
Westinghouse E. & M. Co.

Gates, Car
Brill Co., The J. G.
St. Louis Car Co.

Gear Blanks
Brill Co., J. G., The

Gear Cases
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion
Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Girders, Laminated
Lorain Steel Co.

Gong (See Bells and Gongs)

Greases (See Lubricants)

Grinders and Grind. Supplies
Railway Track-work Co.

Grinders, Portable
Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.

Grinding Bricks and Wheels
Railway Track-work Co.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Ball &
Manganese
Ramapo Ajax Corp.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harpes, Trolley
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Heaters, Car (Electric)
Consolidated Car Heat'g Co.
Gold Car Heat. & Ltg. Co.
Nat'l Ry. Appliance Co., P.
Smith Heater Co., Peter

Helmet-Welding
Railway Track-work Co.

Heaters, Car, Hot Air and
Water
Elec. Service Supplies Co.
Smith Heater Co., Peter

Hoists, Portable
Ingersoll-Rand Co.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.

Indicating Signals
Oskel Equipment Co.

Instruments Measuring, Test-
ing and Recording
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and
Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Stand. Underground Cable
Co.

Insulating, Silk & Varnish
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse E. & M. Co.

Insulators (See also Line
Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Insulators, High Voltage
Lapp Insulator Co., Inc.

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

**COST MORE PER BRUSH
COST LESS PER CAR MILE**

W. J. Jeandron

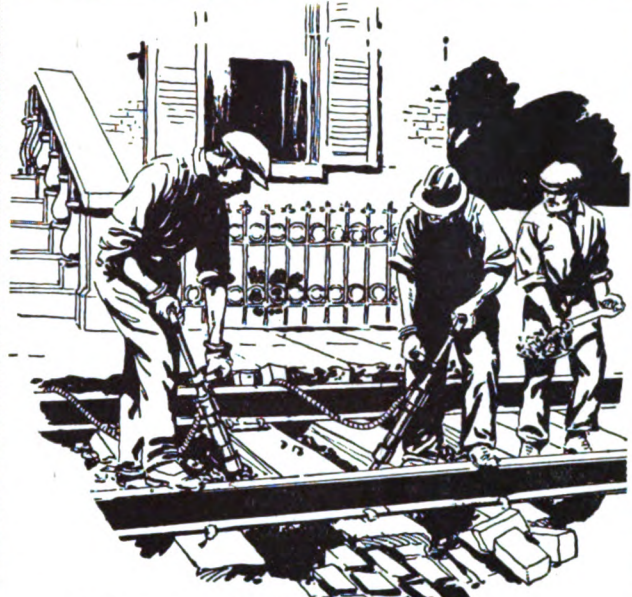
345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.

Chicago Office: 1657 Monadnock Block

San Francisco Office: 525 Market Street

**Canadian Distributors: Lyman Tube & Supply Co., Ltd.,
Montreal and Toronto**



"Imperial" Pneumatic Tie Tampers

**Reduce track tamping
and maintenance costs.**

Ask for Bulletin 9123

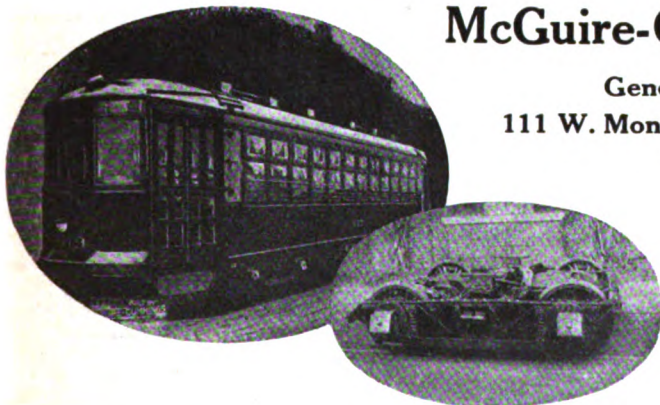
INGERSOLL-RAND COMPANY

11 Broadway, New York 170-TT

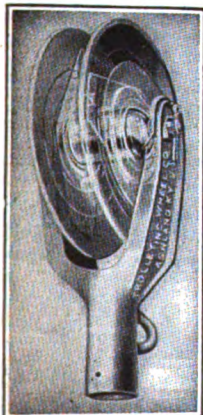
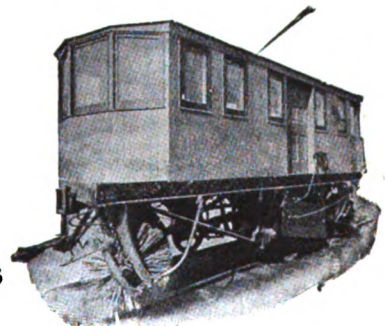
McGuire-Cummings Manufacturing Co.

General Offices:

111 W. Monroe St., Chicago, Ill.



**Street Cars
Trucks
Snow Sweepers**



Tests Prove That Fewer Inspections Are Required

This fact about the Thornton Side Bearing Trolley Wheel is due to the method of lubrication and the extremely long life of the bearings. The construction insures a perfectly balanced wheel and freedom from vibration and noise. Users are getting over 50,000 miles from the side bearings. Write for Bulletin.

Thornton Trolley Wheel Co.

**Incorporated
Ashland, Kentucky**



We make a specialty of

ELECTRIC RAILWAY LUBRICATION

**We solicit a test of TULC
on your equipment**

**The Universal Lubricating Co.
Cleveland, Ohio**

- Jacks** (See also Cranes, Hoists and Lifts)
Buckeye Jack Co.
Elec. Service Supplies Co.
- Joints, Rail**
(See Rail Joints)
- Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
St. Louis Car Co.
- Junction Boxes**
Std. Underground Cable Co.
- Lamps, Guards and Fixtures**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Arc & Incandescent**
(See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Signal and Marker**
Nichols-Lintern Co.
Ohio Brass Co.
- Lanterns, Classification**
Nichols-Lintern Co.
- Lightning Protection**
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
- Shaw, Henry M.**
Westinghouse E. & M. Co.
- Line Material** (See also Brackets, Insulators, Wires, etc.)
Anderson Mfg. Co., A. & J. M.
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Locomotives, Electric**
Baldwin Locomotive Works
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Lubricating Engineers**
Galena Signal Oil Co.
Texas Co., The
Universal Lubricating Co.
- Lubricants, Oil and Grease**
Galena Signal Co.
Texas Co., The
Universal Lubricating Co.
- Manganese Steel Guard Rails**
Ramapo Ajax Corp.
- Manganese Steel Switches**
Frogs & Crossings
Ramapo Ajax Corp.
- Meters** (See Instruments)
- Molding, Metal**
Allis-Chalmers Mfg. Co.
- Motor Buses** (See Buses, Motor)
- Motors, Electric**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.
- Motors and Generators, Sets**
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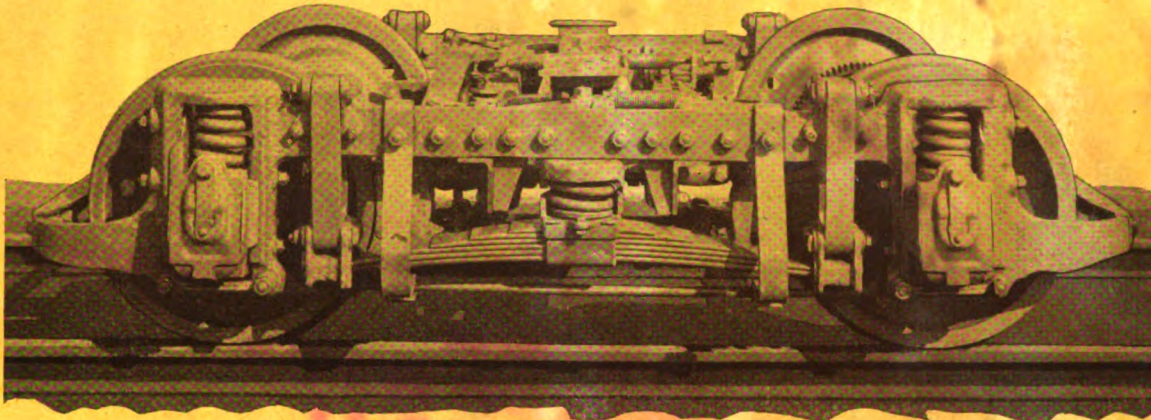
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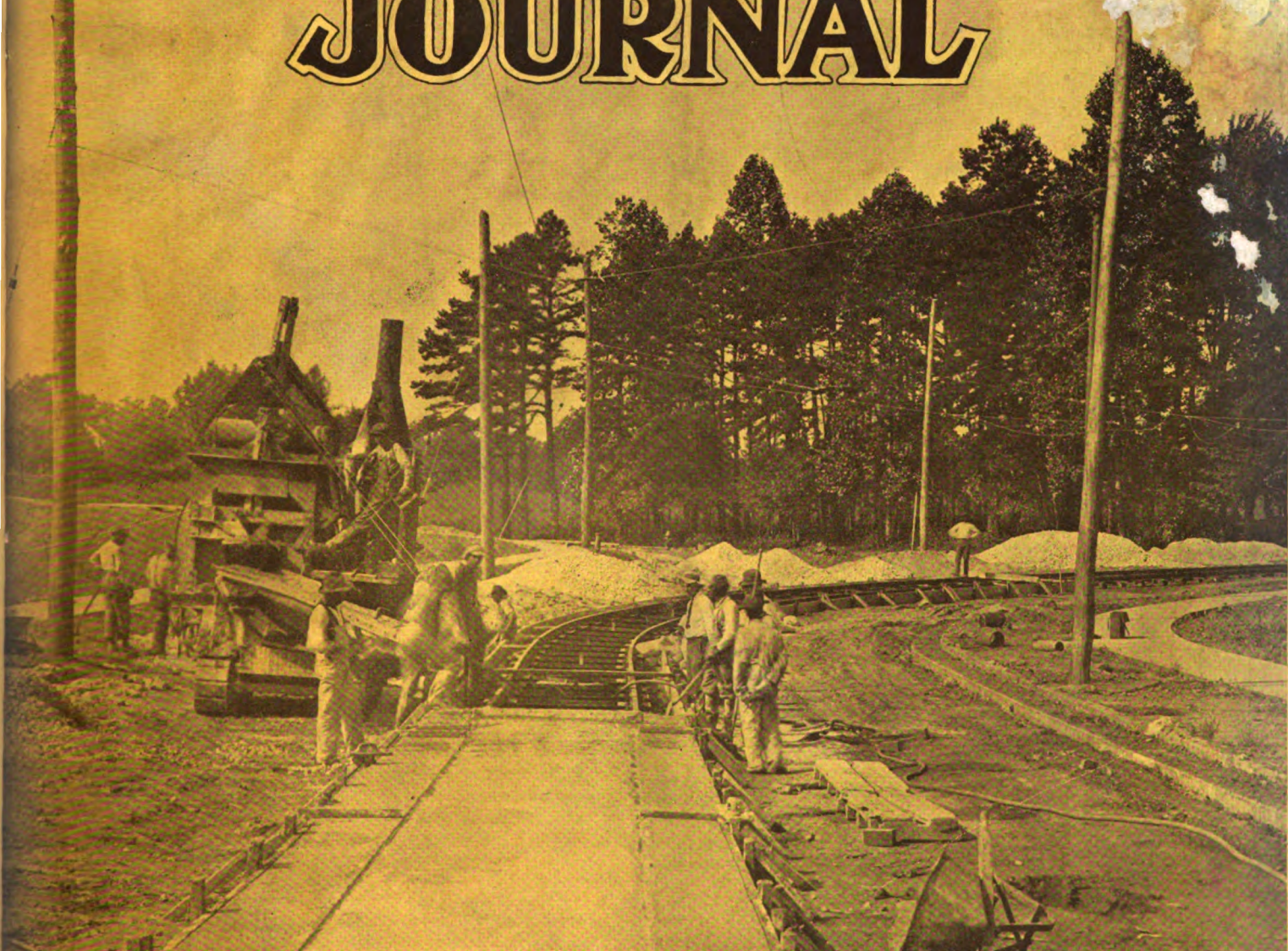
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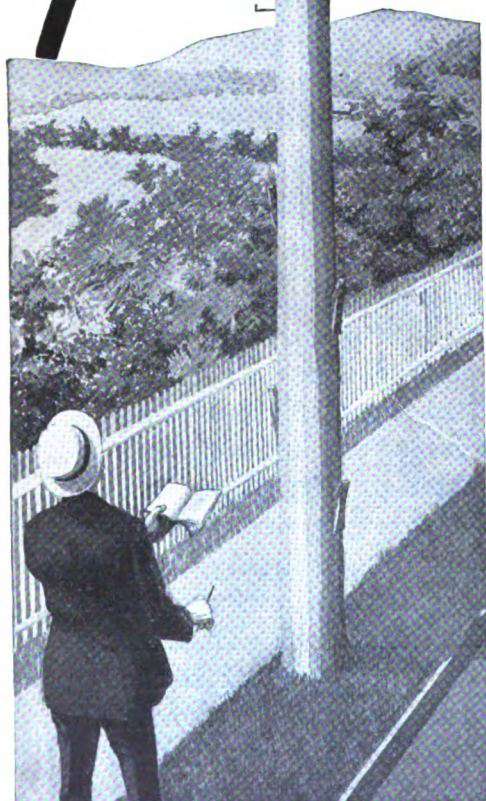
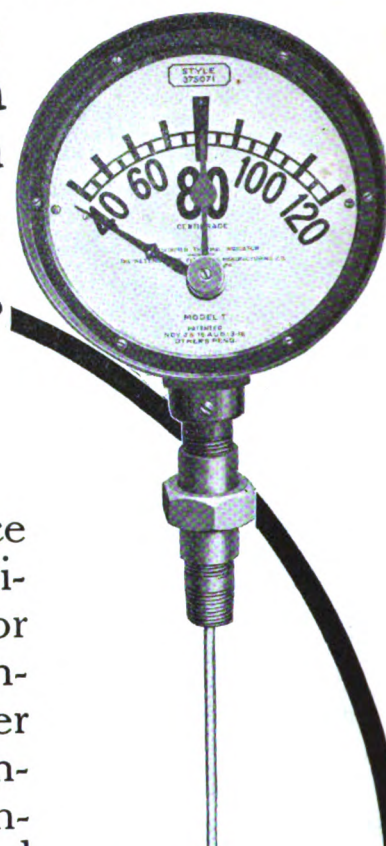
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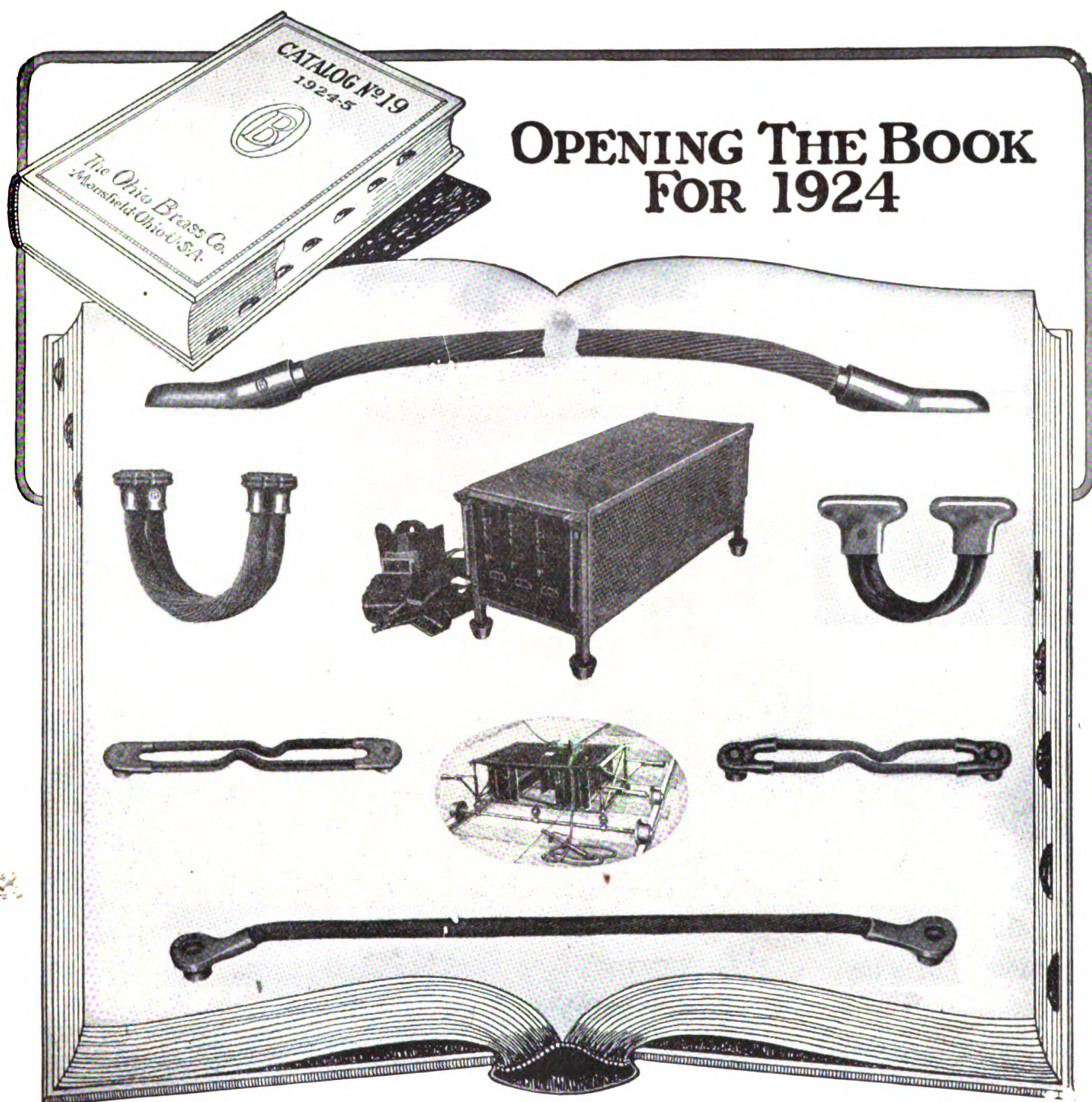
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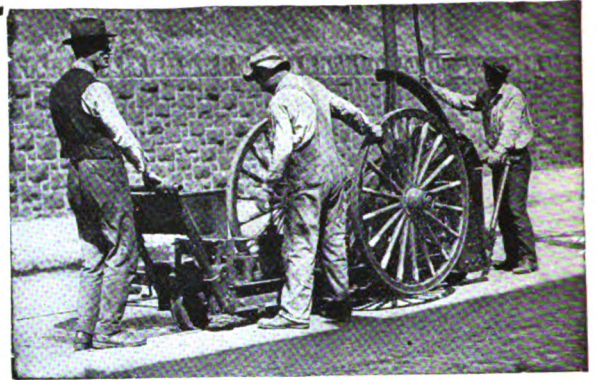
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AGENTS

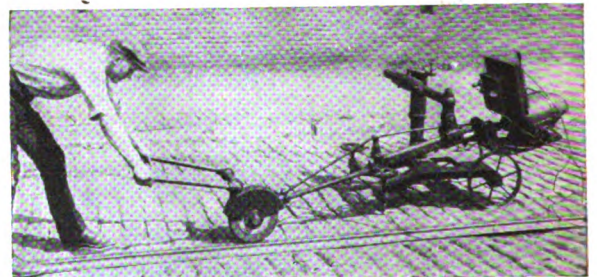
CHESTER F. GAILOR, 30 Church St., NEW YORK
CHAS. N. WOOD CO., BOSTON
ELECTRICAL ENGINEERING & MFG. CO., PITTSBURGH
ATLAS RAILWAY SUPPLY CO., CHICAGO
J. H. DOERR, LOS ANGELES
EQUIPMENT & ENGINEERING CO., LONDON



"Reciprocating" Track Grinder



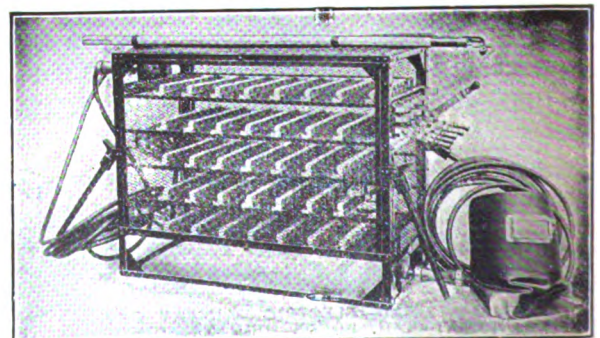
"Universal" Rotary Track Grinder



"Atlas" Rail Grinder



"Hercules" Rail Grinder



"Ajax" Electric Arc Welder



Track and Trolley Equipment

Check your needs.

- Transmission Line Devices
- Pole Line Material
- Trolley Line Supplies
- Section Switches
- Trolley Wire Pick-ups
- Track Tools
- Track Wrenches
- Rail Tongs
- Drilling Machines
- Rail Benders
- Rail Bonds
- Bonding Machines
- Bond Testers
- Third Rail Equipment

Only a few weeks now, 'til Spring is in the air. Then the picks and shovels come out and dirt begins to fly.

Look over the list at the left, and order the items you're going to need.

Keystone equipment and Keystone materials for your Spring construction program will expedite the work and make a better job of it.



The Keystone Line is the dependable line. An efficient, economical source of supplies.



ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
829 Oliver Building

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

NEW YORK
50 Church St.

SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.

BOSTON
88 Broad St.

Why— Plain Tubular Steel Poles?

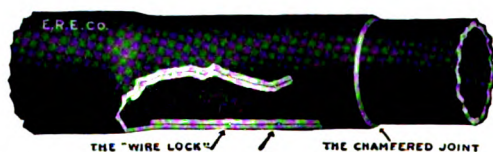
SPAN
WIRE

Because: — the circular tube is the one shape which develops the maximum strength of the metal in all directions. Like the arch in masonry construction, the tubular steel pole is recognized by engineers as the strongest and most reliable section to use. Especially valuable at corners where pull-offs tie in at various angles. Tubular steel poles are cheapest to maintain, and easiest to paint.

SPAN
WIRE

Why— Elreco Tubular Steel Poles?

Because: — Elreco's *patented wire lock swedge joint* increases the natural efficiency of the tubular pole by making the joints as strong as the pole itself. They will not collapse or telescope at the joints. Notice the construction illustrated below.



*Patented Wire Lock Swedge Joint,
an exclusive Elreco feature.*

The Electric Railway Equipment Co.

Cincinnati, Ohio

New York Office: 30 Church Street

ELRECO POLES



—DURABILITY

**A quality which counts on the
maintenance and depreciation sheets**

National Pneumatic Door Engines are built to last as long as the car itself—or even longer. They are standardized, tested, proved equipment. In material and in workmanship, they are built for the utmost permanence and low maintenance cost. Look over the following items of construction detail which lend them this quality of rugged durability.

National Pneumatic Door Engines

Their endurance is due to these features

All parts extra strong and rigid

Large bearing surfaces

**Rack and gear enclosed to keep
out dirt and retain lubricants**

**Valves of hard drawn manga-
nese bronze**

**No packing glands to be main-
tained**

Non-adjustable reserve cushion

Automatic lubrication.

NATIONAL PNEUMATIC EQUIPMENT

DOOR ENGINES

DOOR AND STEP
CONTROL

OPERATING
MECHANISMS

MOTORMAN'S
SIGNAL LIGHTS

Let Us Demonstrate Them

National Pneumatic Company, Inc.

Originators and Manufacturers

PRINCIPAL OFFICE: 50 Church St., NEW YORK

Philadelphia—Colonial Trust Building Chicago—McCormick Building

Works—Rahway, New Jersey

Manufactured in Canada by Dominion Wheel & Foundries, Ltd., Toronto, Ont.



INDEPENDENT DOOR CONTROL



Showing Correct and Convenient Method of Passenger Interchange with Independent Door Control as Provided by the New SELECTOR VALVE.

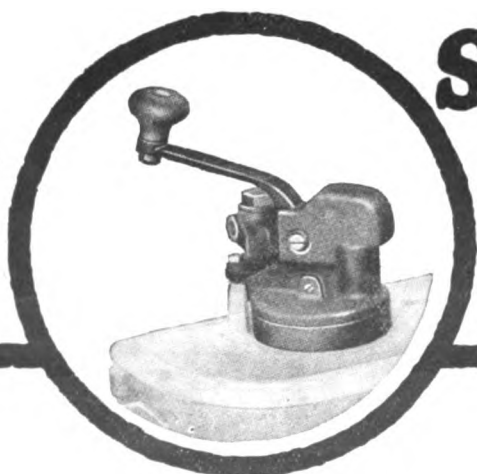
Protection in Winter!

Independent control of double-passage doors on Safety Cars is extremely desirable in winter.

When stops are made for passengers moving in but one direction, only one door need be used; the other door, remaining closed, protects those inside from undue draft.

Aside from adding to passenger comfort and satisfaction, the power required for adequate heating is materially reduced.

The Door Selector Valve is the simplest and most practical means of securing independent door control. Let us show you how easily it can be adapted to your needs.

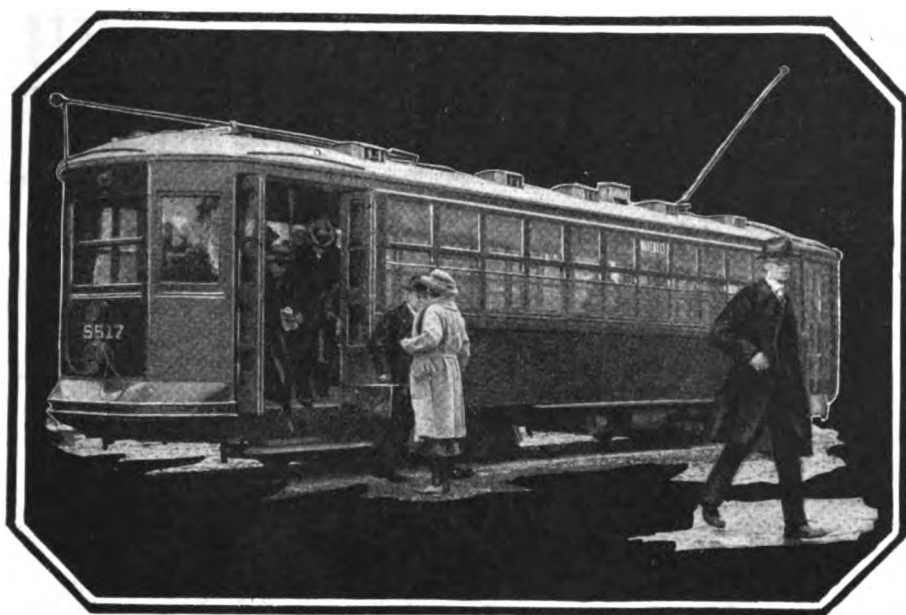


SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

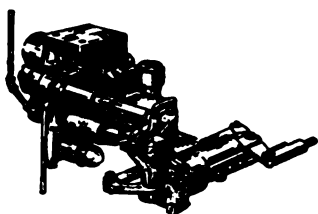
Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

We furnish the Air Brake and Safety Car Control
Equipment which *makes* the Safety Car



The "VARIABLE LOAD" BRAKE *as applied to light-weight surface cars*



THE VARIABLE LOAD BRAKE

The Westinghouse Variable Load Brake has been developed to solve the problem of controlling cars under widely varying load conditions. It is an attachment which may be added to any straight air or semi-automatic equipment whereby the braking force is automatically adjusted to suit the weight on the car, by regulating the brake cylinder pressure as the weight changes. The adjusting mechanism is thrown into engagement by the opening of the car doors. While the doors are open, passengers are leaving and entering the car, and when the doors are closed again, the condition of loading will be that under which brake operation will take place for the next stop, or a slow-down, as the occasion may demand. The use of the Brake insures stopping within a uniform distance regardless of whether the car is empty or loaded.

THE introduction of high-capacity, light-weight cars has resulted in such a high ratio of load to light weight as to clearly indicate why the Westinghouse Variable Load Brake meets a very definite need.

As the ratio of live to dead weight increases, the stopping ability of a loaded car diminishes, and the stopping distance (or time) is materially lengthened, *if ordinary brakes are used.*

But there is no difference whatever in stopping distance as between an empty or loaded car *when the Variable Load Brake is used.*

Short, uniform stops mean a saving of time and a speed-up of car schedules—increased mileage; increased earning power—especially in congested districts.

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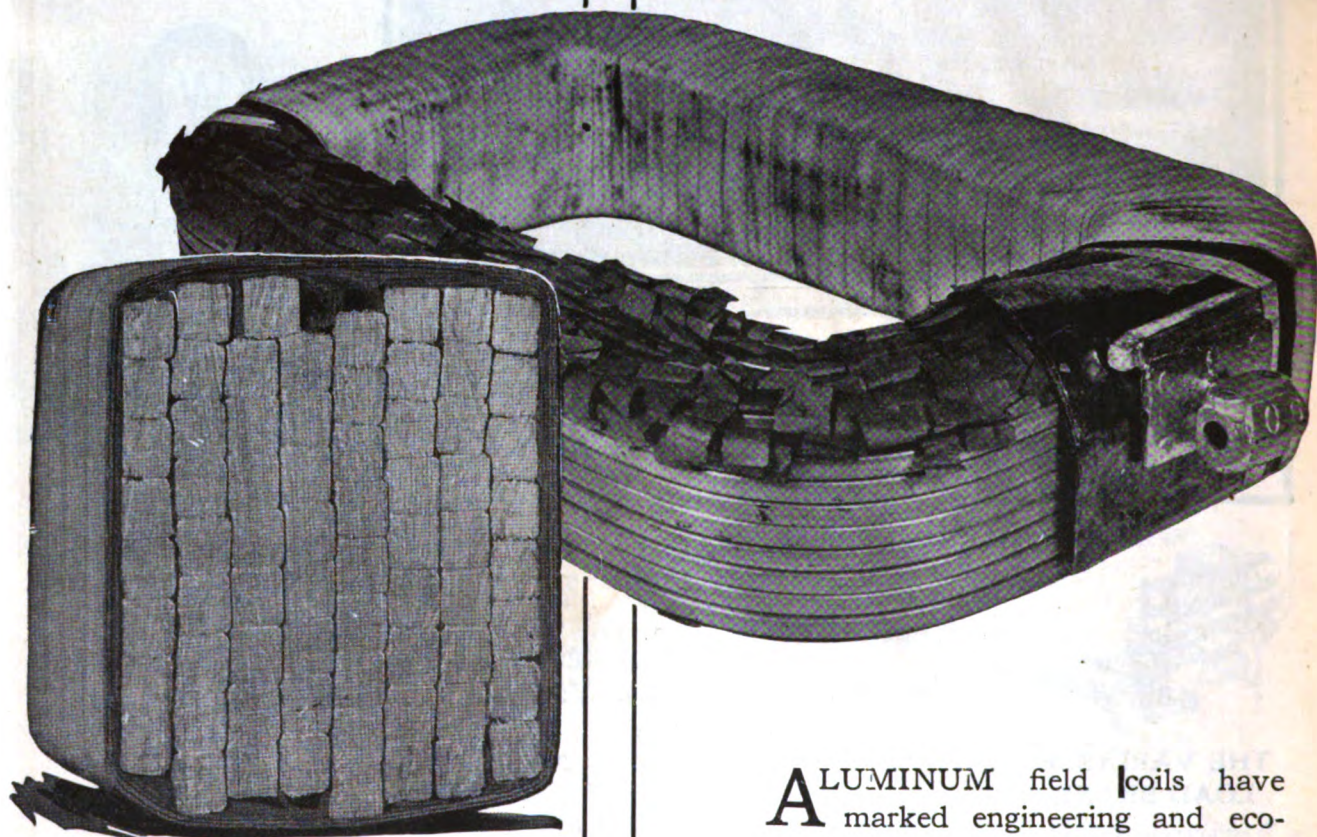
WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works: WILMERDNG, PA.

WESTINGHOUSE TRACTION BRAKES

ALUMINUM

Attractive Co



ALUMINUM field coils have marked engineering and economic advantages.

Nearly two year's experience in the sales and engineering development of aluminum field coils has shown that the principle is fundamentally correct.

As previously announced, L. E. Gould and his associates, as the Aluminum Coil Manufacturing Company, have exclusive control of the design and production of Aluminum Field Coils, manufactured under the Lind patent process.

MORE THAN 70 ELECTRIC

FIELD COILS

Replacement Proposition

This offer covers the replacement of field coils in bad order from any cause other than defective material and workmanship. All *new* aluminum field coils, as shipped, are *warranted* against defective material and workmanship.

*Replacements for 60% of
the sale price of the new coil*

For any complete aluminum coil that has been rendered useless *from any cause*, we will furnish a new duplicate coil, both F.O.B. Chicago, for 60% of the then sale price of the new coil. For example, a new coil costing \$20 will be furnished for a similar old coil and \$12.

*Only possible with
Aluminum Field Coils*

This proposition is possible, due to the use of aluminum oxide insulation. The heat from a heavy short to ground does not break down nor in any way harm the oxide insulation and therefore the major part of the wire, in a damaged aluminum coil is just as good as new conductor. Coil for coil, both copper and aluminum have approximately the same scrap value, but the aluminum coil has a much higher reclaim value. Hence this attractive replacement proposition.

*Inherent advantages of
Aluminum Coils*

Aluminum field coils possess many inherent advantages such as substantial weight reduction, freedom from internal shorts and quicker heat conduction to the coil exterior. This proposition gives to the user a coil with an exceptionally low ultimate cost at no higher first cost.

Economy Electric Devices Company

L. E. Gould, Pres., Old Colony Bldg., Chicago

National Railway Appliance Co., New York
L. A. Nott, San Francisco
Burton R. Stare Co., Seattle
Cable Address: Sangamo, Chicago

GENERAL SALES AGENTS:
Sangamo Economy Meters
Lind Aluminum Field Coils
DISTRICT AGENTS:
Peter Smith Heaters—Woods Fare Boxes
Bemis Boyerized Truck Specialties
Miller Trolley Shoes

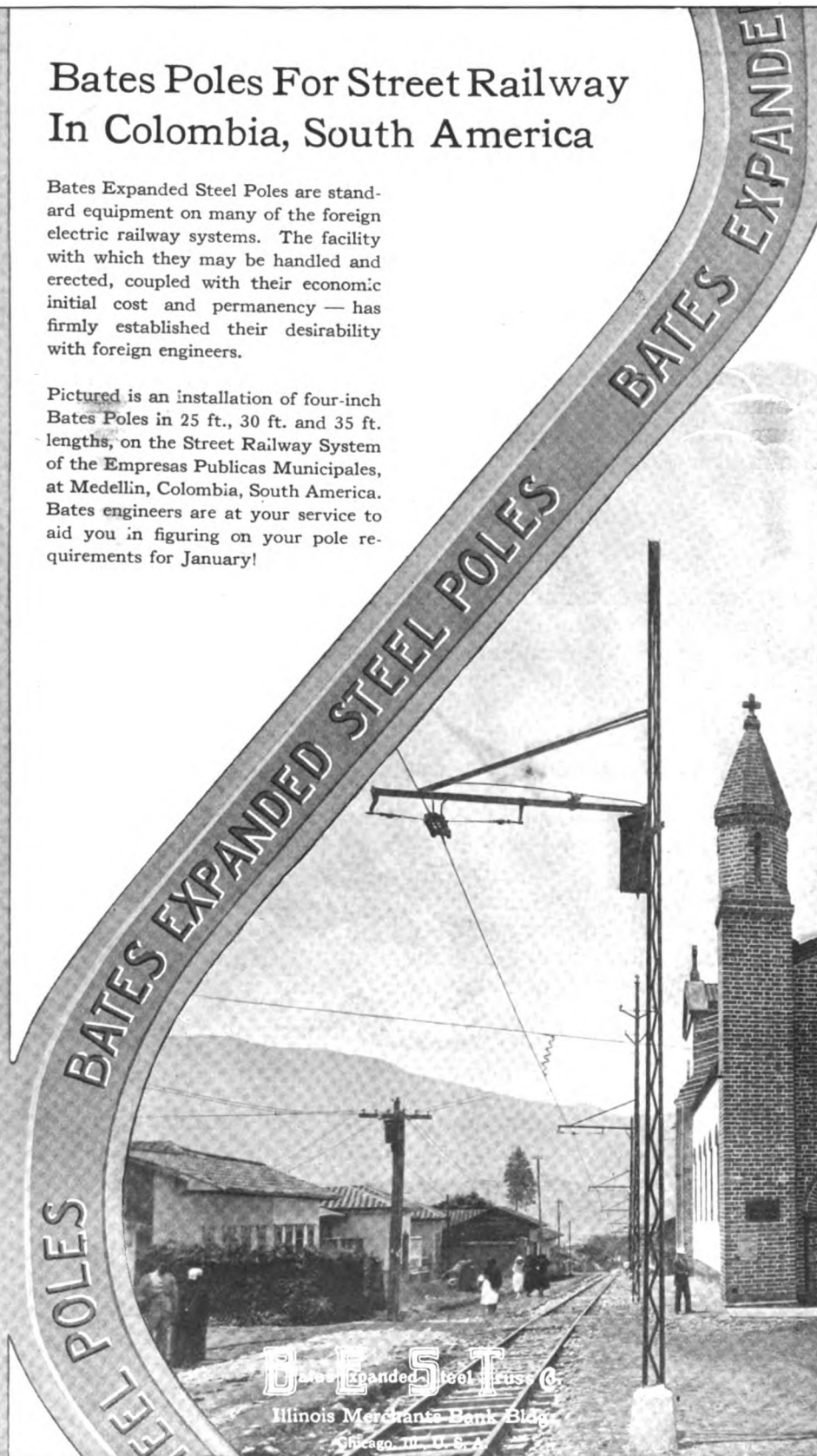
Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Louis
Detroit Railway Supply Co.
Alfred Collyer & Co., Montreal, Quebec

RAILWAYS NOW USE THEM

Bates Poles For Street Railway In Colombia, South America

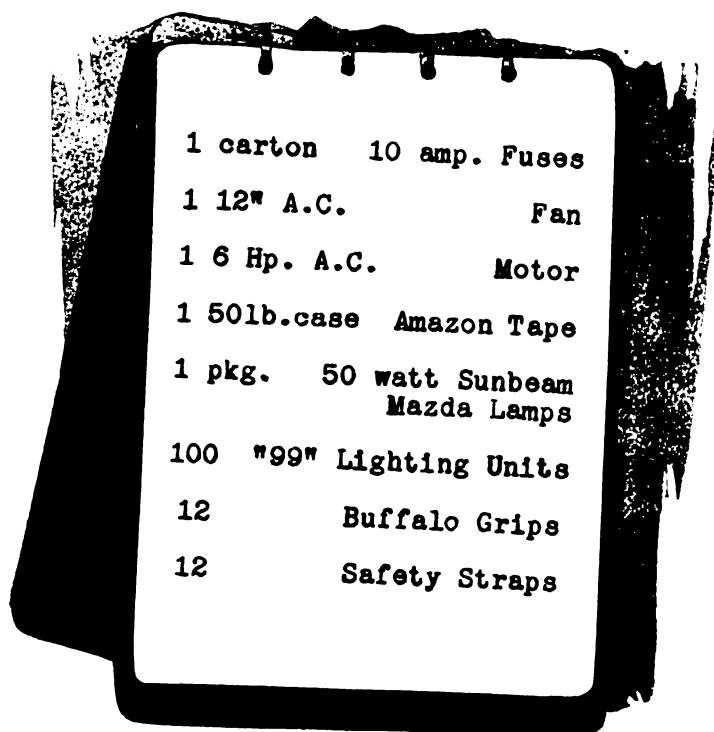
Bates Expanded Steel Poles are standard equipment on many of the foreign electric railway systems. The facility with which they may be handled and erected, coupled with their economic initial cost and permanency — has firmly established their desirability with foreign engineers.

Pictured is an installation of four-inch Bates Poles in 25 ft., 30 ft. and 35 ft. lengths, on the Street Railway System of the Empresas Publicas Municipales, at Medellin, Colombia, South America. Bates engineers are at your service to aid you in figuring on your pole requirements for January!



BEST
Bates Expanded Steel Poles Co.
Illinois Merchants Bank Bldg.
Chicago, Ill., U.S.A.

**BATES ONE PIECE
EXPANDED
STEEL POLES**



Could your stockroom fill this order? *Ours did*

Electrical supplies in amazing variety are specified on orders we receive, all in the day's work. Customers give our claim "Everything electrical" a thorough testing.

And we come through, all right. Our stocks are varied, our deliveries prompt. To see to that, there is a Western Electric Distributing House near you wherever you are.

All this is good for you to remember next time you need supplies. Just let us have your complete order.

Western Electric Company

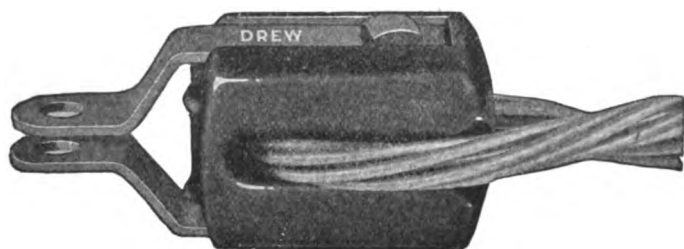
OFFICES IN 47 PRINCIPAL CITIES

DREW Equipment for Electric Railways



Drew Floating Bell Hanger

Positively eliminates loose ears because of tight lock between hanger and ear. Prevents rusted and worn threads. Assures better service with a saving.



No. 7520 Porcelain Strain Clevis

Used in large quantities by leading railway companies for great variety of overhead work. Practical. Convenient. Ample insulation. Strong enough for any overhead work.



Drew Spring Ear

Does away with destructive wear on trolley. Eliminates pounding on trolley wheel, base, hangers, trough structure. Insures smoother and quieter car operation.



Drew Safety Mirror

Greatly reduces boarding and alighting accidents. Quickly adjustable for different types of cars. Gives motorman clear view of steps. Cuts running time because motorman can always be ready for instant starting.



Drew Electric & Mfg. Co.
Cleveland, Ohio

*Descriptive material and prices
on request*



Improved Clark Splicer

Actually becomes part of wire with use, giving smooth underrun for life of wire. V-shaped approach carries wheel on and off splice without jar or vibration. Prevents notches or rough spots.

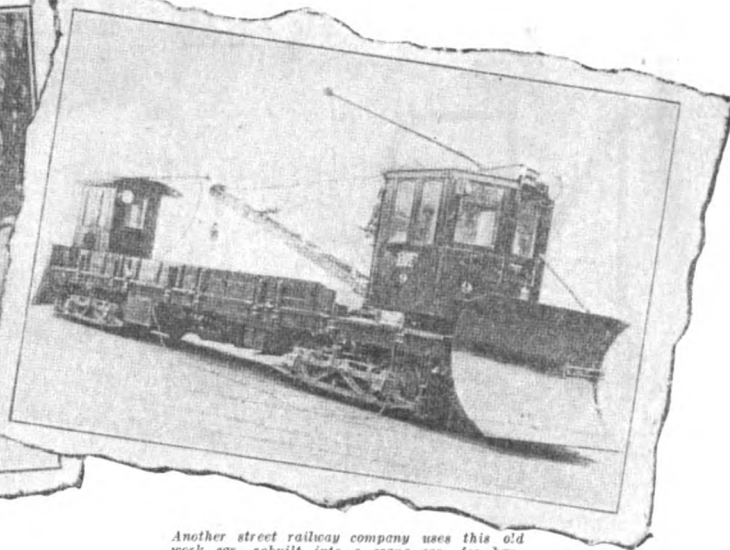
Drew Cushion Ear

The merit of this ear is best recognized from its performance in actual service. Repeat orders over a period of years from large and small properties prove the claims we make for Cushion Ears. Longer life and complete protection for the trolley wire.





This shows how a certain street railway company used a derrick for removing old rails and ties. See Electric Railway Journal Sept. 1, 1923, page 326.



Another street railway company uses this old work car, rebuilt into a crane car, for handling and transporting material. See Electric Railway Journal Oct. 27, 1923, page 743.

Much Better Than Derricks! Much Better Than Crane Cars! For Street Railway Repair Work

Mounted on your used motor truck a Universal Crane can run from job to job at motor truck speed—and leave the tracks clear for traffic! One man can operate it. Full circle swing and requires no outriggers.

Universals have replaced from 20 to 30 men on different kinds of work. Railways and many other prominent concerns have repeated on Universals in the past few years.

Bulletin No. 22-Y shows how well they are suited to all kinds of construction and repair work. Write for a copy.

The Universal Crane Co.
1182 Swetland Bldg.
Cleveland, Ohio



Derricks and cranes mounted on work cars need tracks to run on. These same tracks are needed at the same time by passenger cars. When the tracks are cluttered up with work cars, suspension of trolley service is unavoidable.

What's the remedy? A Universal Crane mounted on a motor truck.

UNIVERSAL

Western Red Cedar

Northern White Cedar



Ordered Yesterday — Shipped Today

That's National Pole Service! To supply it this company maintains more than forty woods points in the North and Northwest, concentrating, treating and distributing yards at various points in the United States and a sales organization of experts in all of the principal cities in America.

The day your order is received for Western Red Cedar or Northern White Cedar poles, the National Pole Company can commence shipment from one of its concentrating or distributing yards.

NATIONAL POLE COMPANY

Escanaba, Michigan

Distributors:

Western Electric Company

Incorporated

Offices in 47 principal cities.



Electric Railway Lubrication

Galena Air Brake Compound

A product of exceptional merit for the lubrication of air cylinders.

Free from acid or injurious ingredients, it protects and preserves leathers.

Possesses highest melting point. Will not separate and clings to cylinder walls.

Prevents rust and reduces friction loss. Maintains a smooth bearing surface that assures maximum pressure on piston.

Endorsed by leading manufacturers of air brake equipment. Carries unqualified guarantee of this company for service and satisfaction.

When ordering be careful to specify by name:

*"Galena
Air Brake
Compound"*



Galena-Signal Oil Company

New York

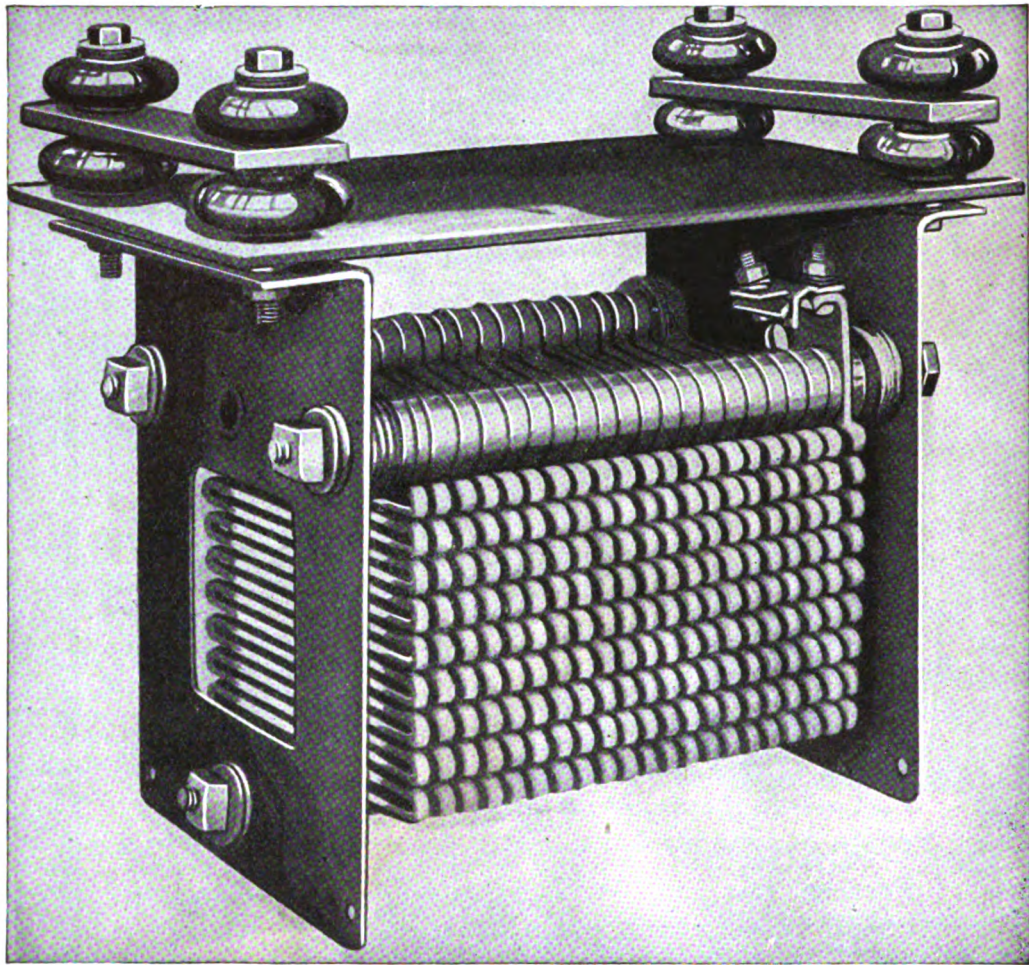
Franklin, Pa.

Chicago

and offices in principal cities



Another step in Standardization



An improved Resistor without new repair parts

This new BG Resistor combines the advantages of the well-known CG type and the rigid grid construction of the RG type. At the same time it minimizes your stock of resistor parts because it is interchangeable, both electrically and mechanically, with other resistors on the market.

Let our railway engineering specialists explain fully.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities



GENERAL ELECTRIC

New York, January 19, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, Editors

Volume 63
Number 3

Massachusetts Senate Acts Ill-Advisedly

THE action of the Massachusetts Senate in requesting the department of Public Utilities to rescind its recent decision authorizing a general increase in commutation rates on the railroads in the Boston metropolitan area marks a dangerous and deplorable step in legislative interference with the regulation of public utilities. At this writing it seems likely that concurrent action by the House will fail, in which case the commission will not be obliged to deal with the anomalous situation involved in the senatorial outgiving.

The whole theory of regulation by an expert tribunal, however, is concerned in such an act as the Massachusetts upper chamber performed. Advocates of the measure contended that as the department is a creature of the Legislature, which has not the time (sic) to investigate rate problems, the creating body has the privilege of setting aside the judgment of the board! On this theory bills have been annually introduced in an attempt to secure legislative action upon questions within the commission's jurisdiction, but these measures generally die a well-deserved death. If the findings of the commission, made after thorough and expert inquiry, are to be made the sport of politics, the outlook for fair regulation is gloomy indeed. But it is believed that gestures of the kind noted in this instance will not be generally indorsed by public opinion.

How Much Does This "Economy" Cost the Railway?

IN THE shop of an Eastern electric railway operating more than 100 cars there is no wheel press. The work of wheel replacement is done in a city some miles away at the repair shop of a large steam railroad. It is claimed by the traction company that the work done for it at the railroad shop is entirely satisfactory, and that the cost, including freight charges back and forth, is less than it would be if the work were done in the railway's own repair shops. The method adopted therefore results in some direct economy.

One wonders, however, if the railway is not really out of pocket in the end when all factors are carefully considered, because there are several extra expenses which follow indirectly. In the first place it is necessary to keep on hand a larger number of wheels and axles than would be required if there were a wheel press in the railway shop. Among the 100 cars there are naturally various types, and the same kind of wheels cannot be used under all of them. As considerable time elapses before a worn set of wheels can be restored to service, the company must have sufficient wheels and axles of each size so that necessary replacements can be made. This involves a sizable investment.

Because there are no facilities for pressing the wheels off and on the axles it is necessary to have

the sets all made up. These sets of wheels and axles require much space for storage. They cannot be stacked in the same way that loose wheels and axles are commonly stored. As a matter of fact one entire track in the railway repair shop is devoted to the storage of wheels and axles. Thus the capacity of the shop is decreased to the extent of at least two cars.

Experience on this property with various wheels has shown that the flange of one wheel of a pair will often wear thin, while the flange of the other wheel on the same axle remains in perfect condition. Under such circumstances the logical thing to do would be to remove the worn wheel and put on a single wheel of the same diameter. This the company cannot do because it has no wheel press. Instead the whole axle and both wheels must be shipped several miles to the repair shop of the steam railroad. The same procedure is necessary in case of any slight defect which may happen to one wheel while its mate remains undamaged.

One cannot but wonder how much real economy there is in this practice.

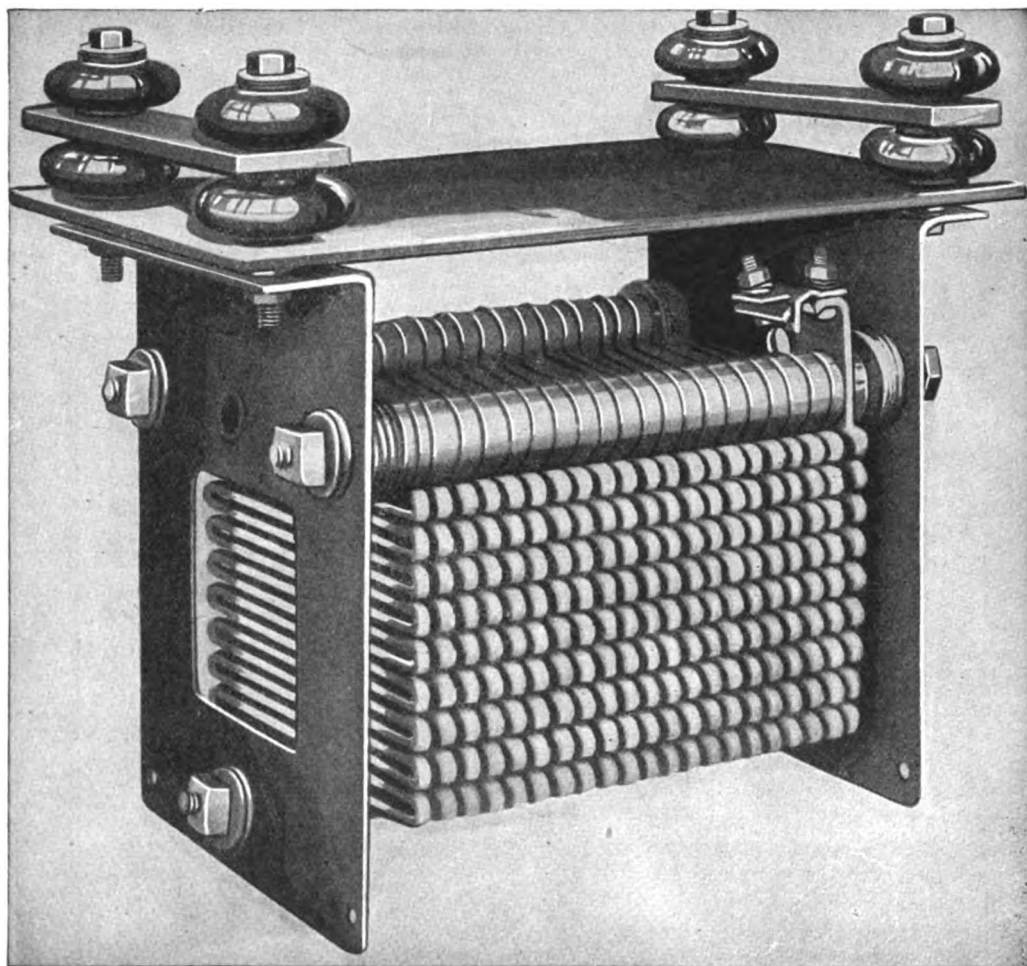
How Far Should Standardization Go?

A STRANGER in a Southern city that is famed for the excellence of its coffee dropped in for breakfast one morning at one of a chain of nationally known restaurants. To his surprise and disappointment the coffee was exactly the same as that served by these same restaurants in New York and Chicago. Standardization had been carried to a point where the advantages of a particular local situation had been utterly wasted.

On the other hand, an instance can be cited where one department of a large industrial organization was in immediate need of several hundred brooms. Another department, on account of an unusual train of circumstances, chanced to have in stock a considerable surplus of brooms. But because these excess brooms were wire wrapped instead of being wrapped with twine they were unacceptable to the first-mentioned department and a new requisition was put through. In this case standardization would have accomplished real economy.

Somewhere in between these two cases lies the answer to the question of standardization. Certain it is not necessary to have the cars on all the electric railways built according to the same design and painted the same color. Yet experience has shown that operating conditions are so similar in many places that standard rails, motors, trucks, etc., give entire satisfaction. Important savings in maintenance expense, as well as in original cost, are thereby effected. Various committees of the American Electric Railway Engineering Association have devoted much careful thought to the question of standardization and have agreed upon many important

Another step in Standardization



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specifications. In some cases the railways have shown a gratifying willingness to accept such specifications. In other cases progress has been slower.

Just how far standardization should go is a question that cannot be answered offhand. But in view of the care used in drawing up the specifications already adopted railway men should go slow in disregarding them. The extension of the process to cover other subjects will naturally be slow. As the need for further standardization develops steps will doubtless be taken to meet it. But the real object must be kept always in mind—to save money for the railways by reducing the number of varieties which manufacturers have to supply and railways have to keep in stock.

The committees have, in general, wisely refrained from going into such great detail that their specifications were impractical. When non-essential items are included in the specifications the whole object of standardization is defeated. If the manufacturer is forced by specifications to meet requirements that are really unnecessary or make more extensive tests than there is genuine need for, increased cost, rather than economy, will be the result.

The Way to Save May Be to Spend

HIGH cost of building construction in recent years has caused many railways to postpone the erection of needed additions to their repair shops. It is often a mistake, however, for a railway to be too economical in this respect. Proper maintenance of equipment is one of the prime requisites for successful operation. Any saving which prevents such proper maintenance of rolling stock quite likely will prove bad business.

As an example of the wastefulness of a policy which neglects to provide suitable repair shops, the case of a railway in the Middle Atlantic States may be cited. This company has three buildings in which maintenance work is done. There is the main repair shop, a large carhouse located some 2 miles from the shop, and a paint shop about 4 miles away. Regular inspections and minor repairs are done at the carhouse. For major repairs a car must be sent to the shop. Unfortunately, when a repair job is undertaken, it is not always possible to tell just how serious it is going to be. It has been found, on the one hand, that cars are sometimes sent to the main shop for trivial ailments, occasioning considerable waste mileage, and on the other hand, that repairs undertaken at the carhouse frequently develop into jobs too big to be handled there, resulting in serious loss of time before the car is received at the main shop and real repairs got under way.

The disadvantage of having the paint shop 4 miles away from the mechanical repair shop is obvious. For general overhauling a car is sent first to the mechanical shop, where it is stripped of its equipment. It is then towed 4 miles to the paint shop, where the paint and varnish are removed. Often it happens that after this has been done, some structural weakness is uncovered that was unknown while the old paint remained on the car. In that case it is necessary to notify the mechanical shop and have a carpenter or mechanic with his tools sent over to the paint shop to make the necessary repairs. If the job is more serious than can be done by a single man, the car may have to be hauled all the way back to the other shop, fixed up, and returned to the paint shop. After the painting is done the car must be towed back to the mechanical shop

where the equipment is replaced. The extra expense of so much dead mileage is an important item, and the value of the time wasted, though difficult to estimate, nevertheless amounts to something on the company's balance sheet.

In this particular case the railway owns sufficient property adjoining the carhouse to erect there a new shop in which all repairs and painting could be done. This very thing has been talked of for years, but has been postponed because the railway has wished to economize. It appears, however, in this instance at least, that the way to save money would be to spend money.

Tax Reduction Prospects in New York State

NEW YORK taxpayers were agreeably surprised by Governor Smith's recommendation at the opening of the Legislature that the state personal income tax be reduced by 25 per cent. They were pleased to discover that the Governor believed the state's financial condition justified a reduction in taxation at this time, and it is certainly to be hoped that a reduction will be accomplished. However, it is by no means obvious that the income tax is the place to cut.

The tax system of the State of New York is quite unlike that of the federal government. Whereas, the income tax is the strong right arm of the federal treasury, it is merely a weak little finger in the state system. The main resource of state and local finances is real estate. The Davenport committee has reported to the Legislature that real estate is heavily burdened, and has urged that the state give it some relief by refraining from imposing any tax upon it. In view of the strained finances of many of the municipalities, it may soon be necessary to go even further than this and perhaps increase, instead of decrease, the income tax, the yield of which is shared with the municipalities in order to ease the local real estate taxes.

Moreover, it should not be forgotten that the most acute problem in taxation in New York State is the public utilities tax, especially that on electric railways. The Davenport committee suggested a utility tax based on the elements of both gross and net income, to replace the present series of state taxes and be articulated with the special franchise tax as long as that exists.

It may be noted that lower taxes on real estate will mean lower taxes on the "special franchises" of public utilities, and that a full state treasury may encourage the State Tax Commission to adopt a more reasonable attitude in valuing these special franchises. The loss of the recent proposal for a constitutional amendment to permit a thoroughgoing reform of the public utility tax law should not be made an excuse for refusing to grant such a measure of relief as can be immediately supplied.

The proposal to cut the income tax, rather than the state "direct tax" on real estate, is plainly dictated by political rather than financial considerations. A scheme which would enable each income tax payer to strike off 25 per cent of his bill and consider the saving a personal present from the Governor has very strong political attractions. Every one appreciates the Governor's thoughtfulness in suggesting it, but, critically examined, it proves to be amateurish finance. It is to be hoped that Governor Smith will be satisfied with having in the East displaced Secretary Mellon on the first page for a day, and not urge the proposal further.

Machinery Speeds Up Trackwork

By W. D. Chamberlin

Principal Assistant Engineer Market Street Railway

The Presence of Four Parallel Tracks on Market Street, San Francisco, Simplified the Problems of a Big Reconstruction Job and also Facilitated Rapid Progress Without Interruption to Traffic—Grades Were Raised as Much as 18 In. in Some Cases to Compensate for Ground Settling



The Reconstruction Work Included a Distance of 17,760 Ft. of Single Track from the Ferry to McAllister Street

IN VIEW of the fact that Market Street, San Francisco, is badly congested with traffic, both railway and vehicular, the record recently made of reconstructing 5,500 ft. of single track and paving in twenty-five days is considered particularly good. This was only part of a larger job, however, as the reconstruction included altogether 17,760 ft. of single track from the ferry to McAllister Street. Work was commenced in May and completed in December of last year.

Market Street, the main business thoroughfare of San Francisco, is 120 ft. wide and has four parallel tracks, the two outer tracks from the ferry to Sutter Street (4,580 ft. of single track) being jointly owned and operated by the city and the railway. From Sutter Street to McAllister Street there are 8,600 ft. of single track, owned and operated by the city alone. The railway owns the two inner tracks all the way from the ferry to McAllister Street. The recent reconstruction job included the four tracks from the ferry to Sutter Street and the inner tracks from Sutter to McAllister Street.

From the ferry to Third Street, about 12,300 ft. of single track was reconstructed at night. Between 11:30 p.m. and 6:30 a.m. all passenger cars were operated on the outer tracks, leaving the inner tracks free from traffic during those hours. This was accomplished by installing temporary crossovers at several points along the line to allow the cars from the inner tracks to cross over to the outer tracks and back again. Each

day, at 6:30 a.m., the new track was connected to the old so that cars operated on the new track during the day and up to 11:30 p.m.

The average force was about seventy men, not including the concrete gang. The whole night job was handled by this force with the use of a number of labor-saving machines and equipment. The equipment in use consisted of flat-bottom work cars, power-controlled dump cars, a 5-ton crane car, a 7-ton derrick car with a 3,000-lb. drop hammer, pneumatic concrete breakers and tie tampers, an electric bond brazing outfit, a 13-cu.ft. concrete mixer outfit, a special tool for cutting asphalt along the 2-ft. strip, an oxyacetylene outfit and a special crane for loading earth into flat cars.

As the headway was twenty-one seconds between cars during the morning rush hours, it was possible from Third Street to McAllister Street to operate all cars on the outer tracks days and nights, except during the rush hours from 3:30 p.m. to 7 p.m. This enabled work to continue night and day on the inside track construction.

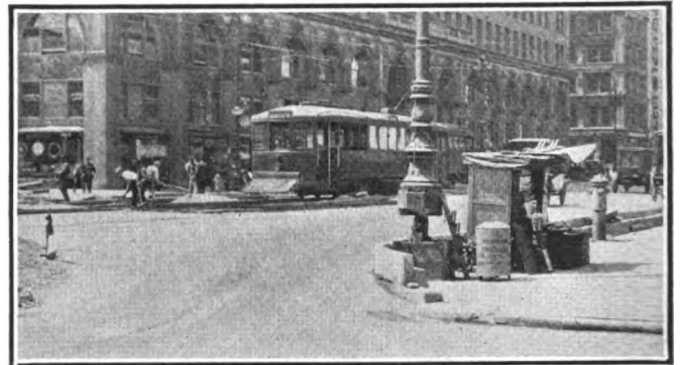
After crossovers had been placed at McAllister Street and at Third Street, the work of reconstructing that section was started on Nov. 12 and the last concrete was laid on Dec. 7. Thus, in twenty-five days, 5,500 ft. of single track was entirely reconstructed and paved, with the exception of one or two blocks of asphalt surface. Although the job was speeded up, it was first class in every way, no hasty or careless work being

allowed. The average force on this job, not including the concrete gang, was about 120 men per twenty-four-hour day, divided into one shift of about fifty and another of seventy men.

The same equipment was used as on the preceding night job, with the addition of an asphalt scoop for loading old sheet asphalt into cars. First the asphalt in the track was torn up and loaded in cars with the scoop. Then a cut $1\frac{1}{2}$ in. deep was made in the asphalt 2 ft. outside of the rails with the special asphalt cutter, which was attached to a car and run at a speed of 300 ft. per minute. After the asphalt had been removed, the 3,000-lb. drop hammer pounded the concrete base, this being followed by three Ingersoll-Rand pneumatic concrete breakers, each operated by two men. By this means the concrete base was broken into sizes small enough to be shoveled into cars. All this work was done during the day, with the exception of the hammer, which operated at night. The night force followed the concrete breakers, pulled up the old rails, ties and some remaining concrete with the 5-ton crane car, after which several carloads of refuse material were hauled each night to the dump, 3 miles distant, where they were unloaded or spread with the car unloader. All old rails were cut with oxyacetylene torches.

Before the day crew arrived each morning, the trench had been partly excavated. The day crew then finished the excavation and laid new track until 3 o'clock each afternoon. At that hour the old and new rails were connected so cars could operate until 7 p.m. All rails were laid with the derrick car, an average of about 275 ft. of single track being laid each day. This work was then followed by the tamping gang with six to eight Ingersoll-Rand pneumatic tampers and the bond brazing outfit. These in turn were followed by men with Vixen files, filing all joints, and then by the concrete

wood ties, spaced on 2-ft. centers, and 9 in. of crushed rock ballast. The paving was sheet asphalt with header blocks along the rails, all on a 6-in. concrete base with a concrete stringer under the rails and blocks. The reason for reconstruction was that the rail, which had



Where the Roadway Was Elevated a Retaining Curb Was Used to Keep Water Off the Sidewalks

been laid in 1909, was badly worn. In fourteen years $\frac{1}{2}$ in. of the rail head had been worn off.

On the new track the trench was excavated 18 in. deep, about 3 in. of the old ballast being removed and replaced with new. Rails designed by the engineering department of the Market Street Railway, of 9-in., 121-lb. section, were laid on 6-in. x 8-in. redwood ties, spaced on 2-ft. centers, the rail joints being the standard 36-in. plate with twelve 1-in. bolts and three concealed brazed bonds. The paving was $2\frac{1}{2}$ in. of Topeka on a 6-in. concrete base and stringer. There are no header blocks along the rails, the Topeka being laid from rail to rail. Header blocks were not used because there is very little vehicular travel along the inside tracks.

An important phase of the work was the raising of the grade of the new track in some places as much as 18 in. above the previous level. This is shown in an accompanying illustration. The continual sinking of lower Market Street, described in the *ELECTRIC RAILWAY JOURNAL* for Dec. 23, 1922, necessitates the raising of the track grade from time to time.

As this job was in the heart of the shopping district, with foot crossings far apart, thousands of pedestrians crossed the open work all along this line, thus greatly interfering at times with the speed of the workmen.

The record made is largely due to the machinery and equipment used, a well-organized and efficient force of men and a thorough co-operation between the various departments, including the city police traffic squad. It is expected that the cost per foot of track will exceed by only a small amount the cost of similar construction on other streets with normal traffic conditions.



It Was Necessary to Raise the Street Grade as Much as 18 In. at Some Points

mixer outfit placing concrete base and stringer. The Topeka wearing surface was placed by a contractor.

All concrete on the 5,500 ft. of single track was cut with three pneumatic breakers in eighteen days, about 39,000 sq.ft. being broken up. All old track and paving was removed and new rails laid in twenty days. The tamping required twenty days. All new concrete was placed in nineteen days, about 54,000 sq.ft. being laid. The Topeka surface, 54,000 sq.ft. in extent, was laid in three and one-half days.

The old track consisted of 9-in., 141-lb. rails on red-

Section Numbers of Trains Are Carried on Dash

WHEN several cars operate as different sections of a train on the single-track lines of the York Railways it is customary to mark each of the sections with a green marker bearing a white cross, except the last section, which carries a small sign reading "Last Car." This system of designation has been found by the company to be more convenient than the use of green and white flags, as is customary on steam railroads and many interurban electric railways.

Getting Best Results with Heater Control Equipment

How to Install, Inspect, Test and Maintain Mercury Thermostat Equipment in Order to Get Best Operating Results and Minimize the Maintenance Expense—This Gives the Methods Recommended as Best by One Manufacturer as Result of Experience on Many Properties

*By L. P. Hynes**

IN ORDER to insure the maximum net saving from the use of thermostats for controlling the temperature of electrically heated cars, it is very important that these devices be properly installed and maintained.

A thermostat control equipment consists of two units, a mercury thermostat and a magnetic switch. The proper location of these two units relative to the rest of the heater equipment is shown diagrammatically in Fig. 1. The actual location of these devices in the car is also important. The box containing the magnetic switch should preferably be mounted overhead on a vertical wall of the car vestibule adjacent to the heater switch fuse box, as this simplifies the connections and reduces the wiring to a minimum. It is not a good plan to mount the magnetic switch under a seat on the floor of the car where inspection is difficult. If it is absolutely impossible to mount it in the position recommended, the next best location is in a weatherproof box suspended underneath the car.

The best place for mounting the thermostat is at a point in the car body about 5 ft. above the floor and where it will not receive direct drafts from any source. Ordinarily, it should be placed near the longitudinal center of the car, except on cars having center doors. With a center door the best location is approximately at the midpoint in either portion of the car.

Having determined the best location for the magnetic switch and the thermostat, the wiring should then be done according to the diagram usually supplied by the manufacturer. The proper size of wire for carrying the heater load will correspond to the amperage of the heaters and will vary with different sizes of cars. The size of wire for connecting to the mercury thermostat, however, can always be No. 14 stranded N.E.C. rubber-covered wire. The thermostat should not be attached until the remainder of the installation has been completed and thoroughly tested out. This test can be made as follows:

Inasmuch as the two wires leading to the thermostat are open at that point, ready for connection to the thermostat, the magnetic switch should close the circuit and turn heat current on the heaters. By touching the two wires together the magnetic switch should open and cut off current to the heaters. These wires should be separated and touched together several times to test out the operation of the magnetic switch, before attaching the thermostat in place on the car walls.

It may sometimes happen that when the thermostat

is removed from its packing the mercury column may have become separated in shipment. It can be re-joined by turning the thermostat upside down and tapping it firmly on either the palm of the hand or on a block of wood. With the column thus re-joined, it should be turned back to its normal position with the bulb at the bottom and again tapped to bring the column back to its normal place. With the mercury once in its proper place and the thermometer mounted, the mercury will never separate under any amount of jar in service. It can only be separated when under jar in a horizontal position.

If the thermostat is of the visible type so that the

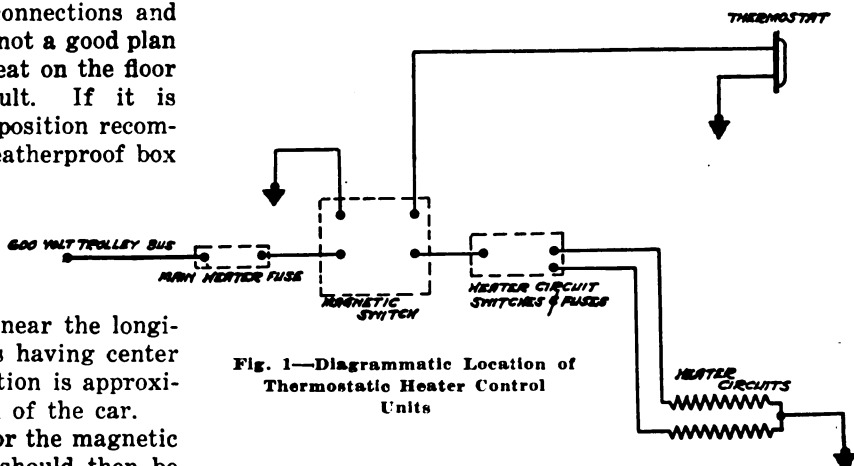


Fig. 1—Diagrammatic Location of
Thermostatic Heater Control
Units

position of the mercury can be seen at a glance, the above procedure will be necessary only when it is seen that separation has occurred. But if the thermostat is of the non-visible type, the thermometer should always be tapped as indicated above in order to make sure that the mercury is properly joined and the thermometer in working condition.

It is very important to make particularly good connections in attaching the wiring to the thermostat, on account of the extremely low voltage of this circuit. This is one common cause of trouble. The connection should be made by means of substantial through terminals or by soldering. It will not do simply to twist the wires together, as slight corrosion is likely to occur later and interrupt a proper contact. If the connections are properly made, there should be very little trouble in keeping the thermostat control operating.

The magnetic switch box should be locked or sealed to prevent its being opened by unauthorized persons, and the thermostat should be inspected as a part of the regular daily inspection of the car in order to see that it has not been stolen, damaged or disconnected.

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In case any damage to the thermostat is discovered, it should be taken off and replaced with another, as the repair of thermostats is a bench job, to be handled with proper tools and test equipment. Furthermore, this work should be done only by a thoroughly experienced and competent man who understands the principle and operation of a mercury thermostat.

Directions for the testing and repairing of mercury thermostats will be given later in this article.

A mercury thermostat control equipment is a thor-

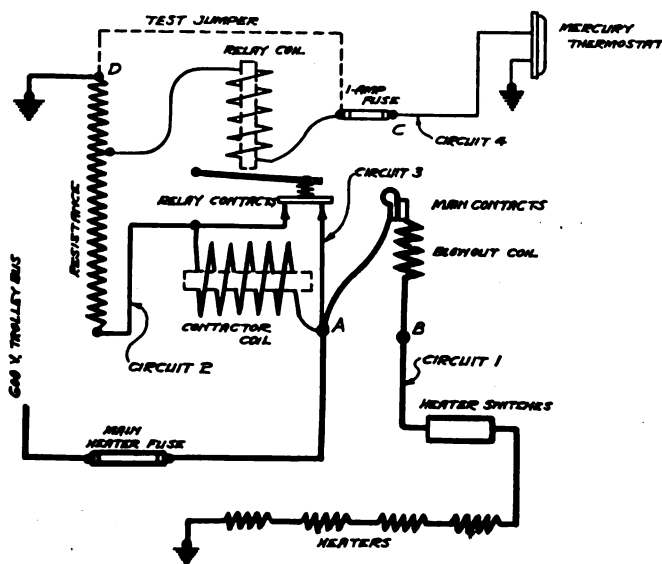


Fig. 2—Diagram Showing the Four Circuits of a Thermostat Control

oughly reliable device when properly handled, but it must be realized that a temperature change of 1 degree Fahrenheit possesses but a small amount of actual power to do work. This small amount of energy must be multiplied sufficiently to operate a reliable and substantial circuit breaker, capable of handling the full heater load under all conditions. This has been well worked out and it is simply a matter of giving reasonable and proper care in order to secure good operating results.

It must be remembered, too, that a mercury thermostat is a glass tube, and no matter how much it is safeguarded and cushioned it must be handled with the same general care that is required for electric lamp bulbs or for meters, gages and other high-class instruments. It is a thoroughly practical device, but it cannot be abused.

GENERAL INSPECTION AND OPERATING TESTS

At the beginning of each heating season the entire equipment should be given a careful inspection and test. In order to do this properly it is necessary for the inspector carefully to study the circuits and understand fully the function of each. Different makes of equipment have somewhat different internal connections, and while some general principles apply in all cases, the inspector should be thoroughly familiar with all the details of the particular installation of which he is in charge.

A mercury thermostat control equipment is always divided into at least four general circuits, as follows:

1. The first is the main heater load circuit, which includes the main contacts of the contactor, the blowout coil, heater switches, fuses and the heaters themselves.
2. The second distinct circuit is the operating circuit of the contactor, which includes the magnet coil and a series

resistance which cuts down the voltage on the coil to a proper amount.

3. The third distinct circuit is a shunt circuit around the coil of the contactor and includes the contacts of the relay. When these contacts are closed, the contactor coil is short circuited and thus de-energized. In some designs this closes the heater circuits, while in others it opens the heater circuits, so that it is necessary to understand the normal functioning of the relay.

4. The fourth distinct circuit is the relay coil and the thermostat circuit. This starts near the ground end of the series resistance circuit. It includes the coil of the relay, the 1-amp. thermostat fuse, the mercury thermostat, then goes to ground. As this shunt circuit is around a small portion of the series resistance, a small low voltage current flows through it whenever the thermostat makes contact. Current flowing through this circuit operates the relay which controls the contactor and thus opens the heater circuit.

Fig. 2 clearly shows these four circuits for a standard Consolidated equipment. Having these circuits clearly in mind, the operation of the equipment is easily understood.

HOW CONTROL FUNCTIONS

When the car temperature is lower than the thermostat setting, the column of mercury is below the upper contact and no current can flow to ground through the fourth circuit. Hence the relay coil is not energized and the relay contacts are kept closed by gravity and firm spring pressure. Current still flows in the second circuit, but as the relay contacts are closed, the contactor coil is short circuited, hence not energized, and the main contacts are closed by a heavy spring.

As a result current flows in the first circuit to the heaters. As soon as the heaters raise the car temperature sufficiently, the mercury column touches the upper contact and current flows to ground through the fourth circuit. This energizes the relay coil and the relay contacts open the shunt circuit (3). Current will now flow through the contactor coil, which will open the main contacts and cut off current from the heaters. When the car temperature falls enough to cause the mercury column to leave the upper contact,

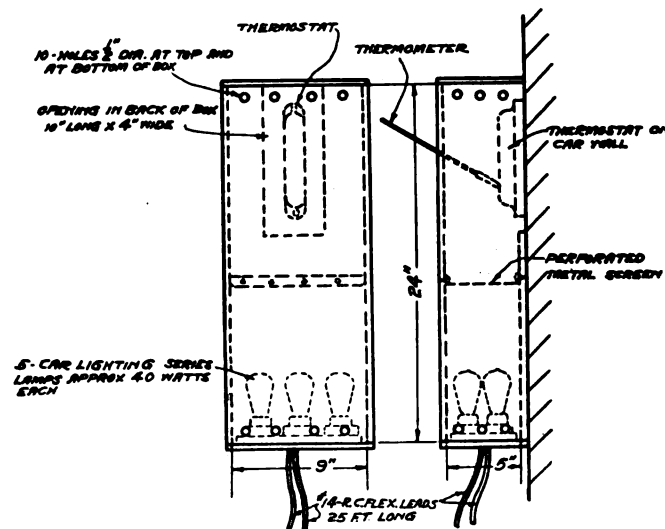


Fig. 3—Box for Testing Thermostats

this will open circuit (4), de-energize the relay coil, close shunt circuit (3) around the contactor coil, de-energize this and allow the main contacts in circuit (1) to reclose, thus restoring current to the heaters.

Having the functions of these circuits clearly in

mind, an electrical test of the main switch panel is very simple.

HOW TO TEST OUT CIRCUITS

Remove the fuse in order to disconnect the thermostat entirely. Apply a test jumper from the live fuse clip to ground terminal *D*, as shown by dotted line in Fig. 2. This should cause the relay contacts and the main contactor contacts to open. Remove the jumper and both contacts should close. If the operation is

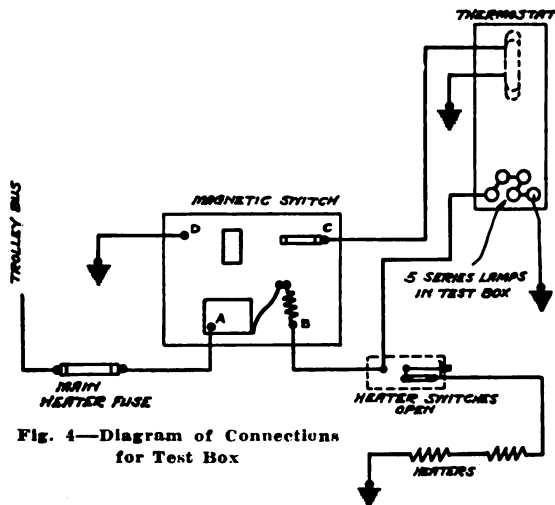


Fig. 4—Diagram of Connections for Test Box

satisfactory, throw in the heater switches and note the action of the contactor under full load by repeating the tests. If satisfactory, test the fuse for circuit and replace, making sure it fits well in the clips to insure good contact. Examine all connections and inspect the contactor tips. These should have a gap of about $\frac{1}{8}$ in. when open and should wipe in closing. The armature must pivot freely to insure snappy action. The relay contacts are of substantial size and of metallized carbon, which insures against relay trouble. The contact gap should be $\frac{1}{8}$ in.

If any of the above tests are not satisfactory, it will be an easy matter to locate the trouble and remedy it.

Local tests of parts of the various circuits can easily be made with a magneto, but the mercury thermostat itself must never be rung through, as the high voltage will damage the mercury column.

Having tested the main switch, the mercury thermostat should be tested. This requires more care and can only be done under proper temperature conditions. The only way to test the thermostat is actually to raise and lower the temperature surrounding it, so that normal variations in air temperature are produced. It is difficult to make tests by artificially lowering the temperature, so that this test should be made when the weather is considerably colder than the temperature for which the thermostat is set. The thermostat can then be easily tested by means of a test box as shown in Fig. 3.

This is simply a light wooden box about 3 ft. high by 2 ft. square, set up in a room free from strong drafts. A bank of lamps can be used at the bottom of the box for heating, but one or two perforated metal screens should be placed above the lamps in order to diffuse the air current so that it will produce a uniform temperature in the upper part of the box where the thermostat is mounted. A few holes should be bored in the bottom compartment containing the lamps and also in the top of the box, to allow a gentle circulation of air up through the box and out. A standard thermom-

eter known to be correct should be inserted through a hole in the top of the box, so that its bulb is close to the bulb of the thermostat under test. The thermostat should then be connected to a regular magnetic switch, properly connected to control the current on the bank of lamps in lieu of the car heaters. The connections for this test box are shown in Fig. 4.

When the current is first thrown on a test box of this kind, it will take a few minutes for the temperature to become equalized. The test of the thermostat should therefore not be made until after the thermostat has been automatically cutting the current on and off the lamps a number of times. After this, a test will disclose the true range of temperatures between which the thermostat operates.

While this test does not exactly duplicate car conditions and hence does not give exactly the same temperature ranges, it will show temperatures near enough to determine definitely whether the thermostat is operating properly. The car temperature for which the thermostat is set and marked should be about half way between the upper and lower temperature limits indicated in this test.

If the thermostat does not operate properly, it should be loosened from the wall and the connections examined. It may be that poor connections have been made, but if no trouble is discovered here the thermostat should be entirely disconnected and a test of the equipment made by touching together the two wires. When these are put together, the main switch should be opened and the lamps in the test box should go out. When they are separated the main switch should close and the lamps in the test box should light. If this does not occur, there is some fault in the wiring between the main switch and the thermostat or between the thermostat and ground, and before making any further thermostat tests it is essential that proper operation be secured by touching these wires together.

If this test indicates that everything else is all right, it is certain that the trouble is in the thermostat itself. This should now either be replaced with another thermostat known to be in good condition or the thermostat cover may be removed for examination.

Perhaps the mercury column will be found separated. If so, it is a very simple matter to rejoin it, as already told. If the column runs freely back and forth, the thermostat is absolutely all right and should be re-applied, as it will give just as good service as a new one. If the mercury column does not run freely, it is very likely the vacuum has been destroyed through the tube being cracked or spoiled by improper connection on high voltage and a new tube is necessary.

If the column has been rejoined properly, the circuit wires should be connected to the thermostat while the cover is removed, and by blowing on the bulb or warming it gradually by any other means the column can be raised until it touches the upper contact. This should cause an operation of the switch. If it does not, the thermostat should be removed for a careful bench test and a new one applied and tested. If the equipment is sent out in proper condition no trouble need be anticipated during the entire season unless some external cause, such as tampering, interferes with it.

Contrary to a general impression, separation of mercury does not happen in service unless something is wrong with the installation which allows a high voltage to pass through the mercury, or the tube has become

cracked so as to allow air to get into it. Under proper conditions neither jar nor normal service will separate a mercury column. A mercury thermostat must have a perfect vacuum for proper operation.

Thermostat repairs should be made by a man who is a good mechanic on fine work. The tube should be carefully examined to determine if there are any cracks which destroy the vacuum. If the tube is cracked it cannot be repaired. On the other hand, the trouble may simply be due to a broken connection. It will be noticed that where the platinum contact comes out of the glass tube, the tube has been banded with fine copper wire which is soldered into a ring to which is soldered the flexible lead wire. If this lead wire has become detached it can easily be resoldered with a small hot iron, the soldering being done quickly to avoid heating of the tube. If it is done properly, the heat will not crack the tube.

A thermostat should never be tested for circuit with a bank of lamps, with a magneto or with a dry battery. The lamps give too much voltage and current, the magneto gives too much voltage and the dry battery, while of low voltage, gives too much current. In any case the mercury column will be damaged. The only proper way to test a thermostat is by connection to the proper terminals of a standard magnetic switch such as would be used on a car, or to a special test set furnished by the manufacturer of mercury thermostat equipments. Bare thermometer tubes can be tested by standing the bulb in a cup of water with a standard test thermometer. Warmer or cooler water should be slowly added and constantly stirred until contact is made or broken. Thermostats mounted in cases should be fastened to an upright board and tested with the box described in Figs. 3 and 4.

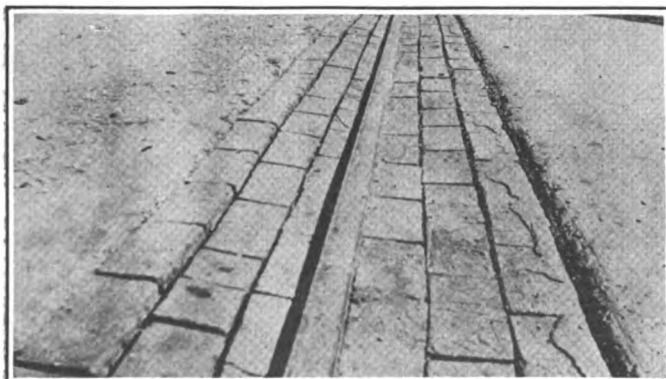
Hot Asphalt Filler Prevents Pavement Bulging*

ON THE city lines of the Northern Texas Traction Company, Fort Worth, a large amount of the track is paved with creosoted wood block headers. In the past, during the dry spell, the creosote sometimes has evaporated from the wood blocks, leaving them entirely dry. When it rained the block would swell and bulge upward, making the pavement uneven and dangerous.

After some study the company overcame this trouble by the following treatment:

As soon as a creosoted block shows signs of drying

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

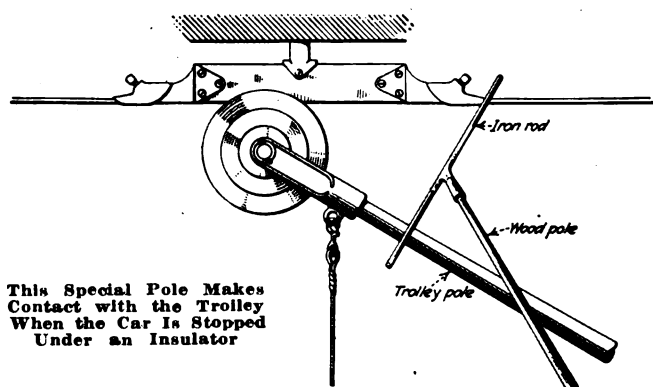


out, the paving gang blows out by compressed air all dirt between the blocks. The cracks between the blocks are then filled with hot asphalt and the surface is covered with the same material. On top of this is spread chat or finely ground rock.

Such treatment of the wood block headers has completely waterproofed them and has eliminated the trouble due to swelling of the blocks. Moreover, it gives a smooth finish to the header paving and has resulted in a large saving in the maintenance cost.

T-Pole Furnishes Current to Stalled Cars

SECTION insulators are often placed at the entrance to terminals, shops and carhouses. Cars habitually enter such structures at low speed and not infrequently stop with the trolley wheel resting on the section insulator. If another car is near at hand, the stalled car can



be pushed beyond the dead line. But there may be no other car handy, and it may be impossible to establish connection between the trolley pole and a live portion of the overhead wire, as the pole will strike against the wall if an attempt is made to raise it and get contact with the wire at some other point.

As the result of numerous such experiences at its Newark terminal, the Public Service Railway has equipped each track with a specially designed pole. It has a long wooden handle with an iron crosspiece securely fastened to the upper end. When a car becomes stalled on a section insulator at the entrance to the terminal it is only necessary for the conductor to alight from his car, and by means of the crosspiece on the T-pole re-establish connection between his trolley pole and the overhead wire. The simplicity of this apparatus makes it inexpensive and much time has been saved.



Dirt Is Blown Out Between Pavement Blocks and Asphalt Applied to Waterproof Them.
The Top Surface Receives a Covering of Chat After Asphaltting

Paving Troubles Along the Rail

Various Causes of Failure of Bond Between Paving and Rail Under Traffic Are Discussed and a Method Is Suggested for Permitting Rail Movement While Preserving the Bond and Strengthening the Paving Edge

By *W. S. Godwin*

W. S. Godwin Company, Inc., Baltimore, Md.

RESPONSIBILITY for railway paving construction and maintenance is, in the majority of cases, fixed by the franchise under which the railway operates. Regardless, however, of who is to pay the bill, common sense and economy would dictate a character of track and paving construction designed to meet the strain of present and future traffic.

There are certain adverse conditions affecting paving in contact with rails which must be met and overcome. Of these, one of the most important is the rail movement. Some movement of the rails under traffic is not only unavoidable, but, from the standpoint of a large percentage of the railway engineers, a desirable condition. Nevertheless, it marks the beginning of paving trouble. Rail movement, no matter how slight, breaks the bond between the rail and any kind of paving or liners which may be used. The break soon widens to an open crack. The necessary side support to the paving is destroyed; seepage occurs and disintegration of paving and base starts. The amount of rail movement affects the speed with which the paving disintegrates. It is always more rapid at loose joints, and at crossings and switches, where there is a heavier car impact and weaker paving, due to the corners.

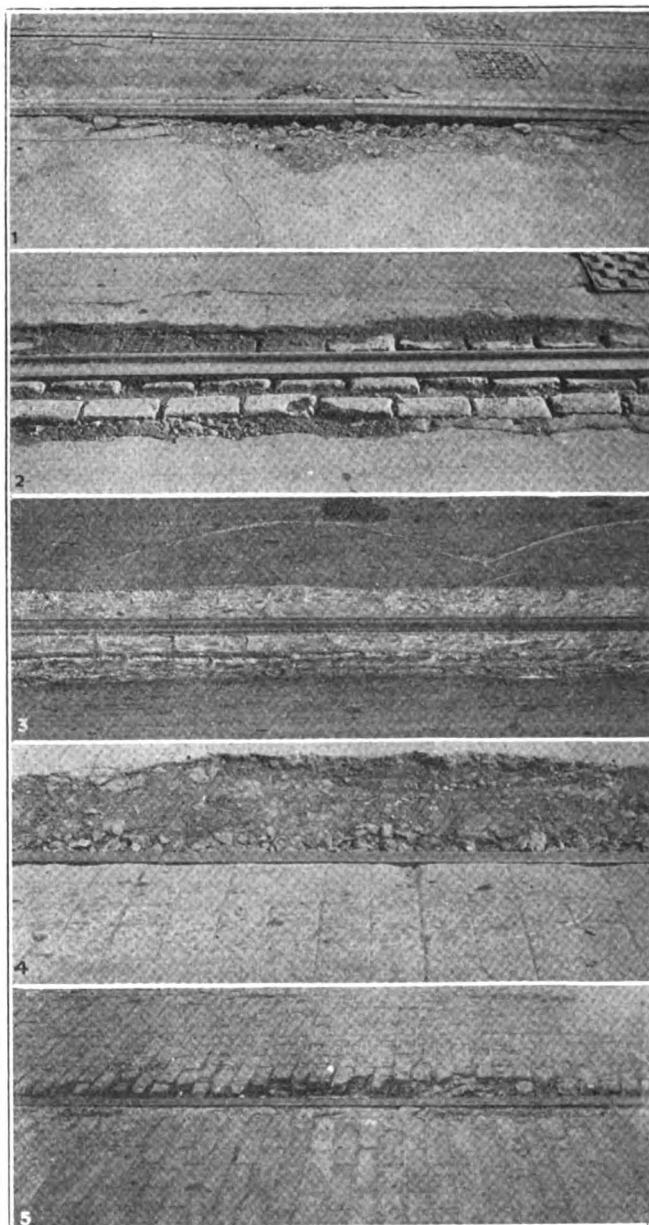
Tests and service have proved conclusively that failures occur first at the edges and corners of any paving slab. In wood cross-tie construction, with no concrete below the ties, there is an edge on each side of each rail. These edges break down under highway traffic and this structural weakness of paving is intensified if the concrete is made sufficiently thin to accommodate block liners. Seepage of surface water between the rail and the paving weakens the sub-base, which allows the ballast and cross-ties to settle. Freezing and thawing of seepage water also cause disintegration by heaving the paving surface and base.

An additional difficulty arises from the use of several kinds of material. The different materials appearing at the surface of street railway paving are steel, granite, concrete, brick, wood and asphalt. Each wears at a different rate, with a resulting break in the smooth continuity of the paving surface. As soon as the weaker wears below the stronger there is a drop and the impact of highway traffic quickly forms low places or ruts. It is not unusual to see three or four materials in the same railway area—brick, steel, granite and asphalt.

The most efficient, economical and durable type of street railway paving, then, is paving which will permit rail movement, paving which possesses permanent edge strength and rigidity, which prevents seepage, and in which the different kinds of material have been kept to the very minimum.

In designing the proper type of street railway paving, railway requirements must be met as well as traffic needs. Track structures should be designed and

built to withstand the maximum car loads, plus a liberal amount for safety. The majority of engineers advocate resilient tracks for one or more of the following reasons: Economy in upkeep of rolling stock; minimum noise from car traffic; material increase in life of rail.



No. 1. Disintegration of asphalt against resilient rails.

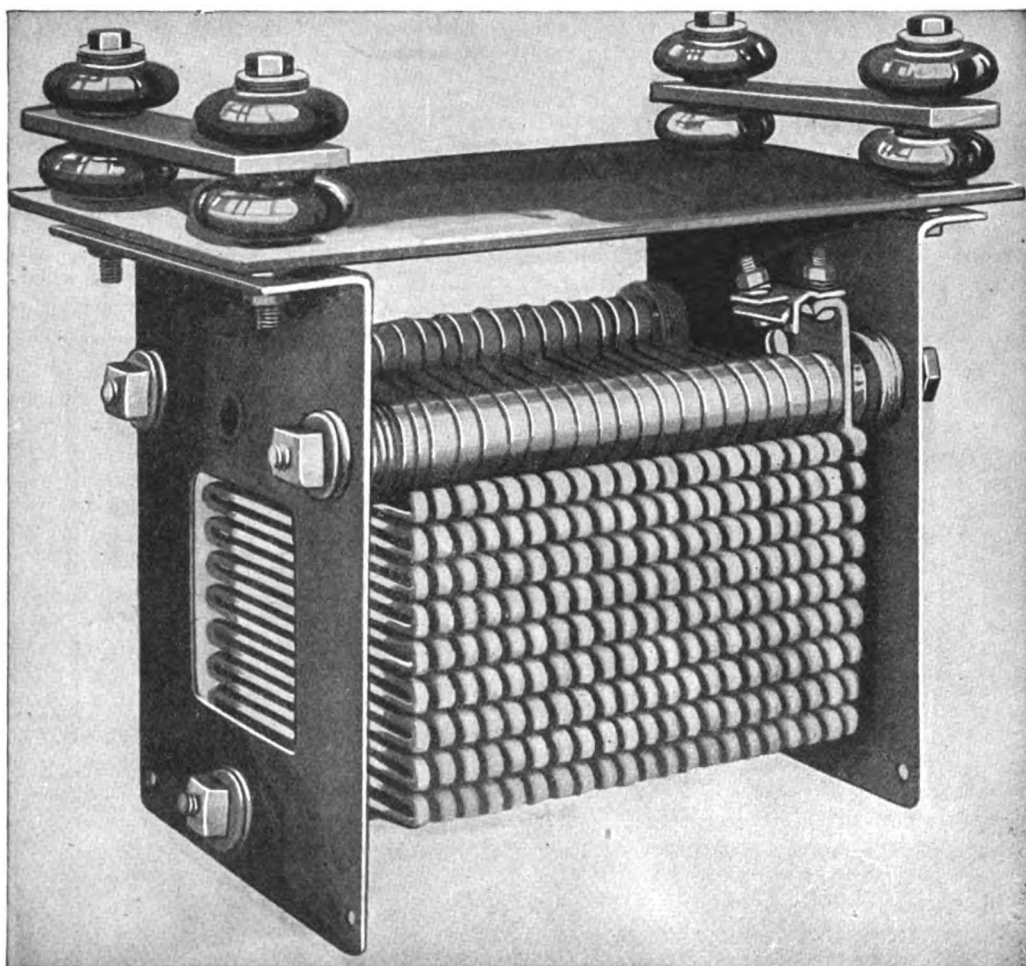
No. 2. Granite block liners dislocated by rail motion and frost action.

No. 3. Surface cracks indicating similar breaks in concrete base caused by highway traffic. Asphalt along second row of liners raised by loose blocks.

No. 4. Concrete paving disintegrated by seepage resulting in frost action through the flangeway.

No. 5. Brick paving loosened by rail movement and broken down by highway traffic.

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GENERAL ELECTRIC

New York, January 19, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, Editors

Volume 63
Number 3

Massachusetts Senate Acts Ill-Advisedly

THE action of the Massachusetts Senate in requesting the department of Public Utilities to rescind its recent decision authorizing a general increase in commutation rates on the railroads in the Boston metropolitan area marks a dangerous and deplorable step in legislative interference with the regulation of public utilities. At this writing it seems likely that concurrent action by the House will fail, in which case the commission will not be obliged to deal with the anomalous situation involved in the senatorial outgiving.

The whole theory of regulation by an expert tribunal, however, is concerned in such an act as the Massachusetts upper chamber performed. Advocates of the measure contended that as the department is a creature of the Legislature, which has not the time (sic) to investigate rate problems, the creating body has the privilege of setting aside the judgment of the board! On this theory bills have been annually introduced in an attempt to secure legislative action upon questions within the commission's jurisdiction, but these measures generally die a well-deserved death. If the findings of the commission, made after thorough and expert inquiry, are to be made the sport of politics, the outlook for fair regulation is gloomy indeed. But it is believed that gestures of the kind noted in this instance will not be generally indorsed by public opinion.

How Much Does This "Economy" Cost the Railway?

IN THE shop of an Eastern electric railway operating more than 100 cars there is no wheel press. The work of wheel replacement is done in a city some miles away at the repair shop of a large steam railroad. It is claimed by the traction company that the work done for it at the railroad shop is entirely satisfactory, and that the cost, including freight charges back and forth, is less than it would be if the work were done in the railway's own repair shops. The method adopted therefore results in some direct economy.

One wonders, however, if the railway is not really out of pocket in the end when all factors are carefully considered, because there are several extra expenses which follow indirectly. In the first place it is necessary to keep on hand a larger number of wheels and axles than would be required if there were a wheel press in the railway shop. Among the 100 cars there are naturally various types, and the same kind of wheels cannot be used under all of them. As considerable time elapses before a worn set of wheels can be restored to service, the company must have sufficient wheels and axles of each size so that necessary replacements can be made. This involves a sizable investment.

Because there are no facilities for pressing the wheels off and on the axles it is necessary to have

the sets all made up. These sets of wheels and axles require much space for storage. They cannot be stacked in the same way that loose wheels and axles are commonly stored. As a matter of fact one entire track in the railway repair shop is devoted to the storage of wheels and axles. Thus the capacity of the shop is decreased to the extent of at least two cars.

Experience on this property with various wheels has shown that the flange of one wheel of a pair will often wear thin, while the flange of the other wheel on the same axle remains in perfect condition. Under such circumstances the logical thing to do would be to remove the worn wheel and put on a single wheel of the same diameter. This the company cannot do because it has no wheel press. Instead the whole axle and both wheels must be shipped several miles to the repair shop of the steam railroad. The same procedure is necessary in case of any slight defect which may happen to one wheel while its mate remains undamaged.

One cannot but wonder how much real economy there is in this practice.

How Far Should Standardization Go?

A STRANGER in a Southern city that is famed for the excellence of its coffee dropped in for breakfast one morning at one of a chain of nationally known restaurants. To his surprise and disappointment the coffee was exactly the same as that served by these same restaurants in New York and Chicago. Standardization had been carried to a point where the advantages of a particular local situation had been utterly wasted.

On the other hand, an instance can be cited where one department of a large industrial organization was in immediate need of several hundred brooms. Another department, on account of an unusual train of circumstances, chanced to have in stock a considerable surplus of brooms. But because these excess brooms were wire wrapped instead of being wrapped with twine they were unacceptable to the first-mentioned department and a new requisition was put through. In this case standardization would have accomplished real economy.

Somewhere in between these two cases lies the answer to the question of standardization. Certain it is not necessary to have the cars on all the electric railways built according to the same design and painted the same color. Yet experience has shown that operating conditions are so similar in many places that standard rails, motors, trucks, etc., give entire satisfaction. Important savings in maintenance expense, as well as in original cost, are thereby effected. Various committees of the American Electric Railway Engineering Association have devoted much careful thought to the question of standardization and have agreed upon many important

specifications. In some cases the railways have shown a gratifying willingness to accept such specifications. In other cases progress has been slower.

Just how far standardization should go is a question that cannot be answered offhand. But in view of the care used in drawing up the specifications already adopted railway men should go slow in disregarding them. The extension of the process to cover other subjects will naturally be slow. As the need for further standardization develops steps will doubtless be taken to meet it. But the real object must be kept always in mind—to save money for the railways by reducing the number of varieties which manufacturers have to supply and railways have to keep in stock.

The committees have, in general, wisely refrained from going into such great detail that their specifications were impractical. When non-essential items are included in the specifications the whole object of standardization is defeated. If the manufacturer is forced by specifications to meet requirements that are really unnecessary or make more extensive tests than there is genuine need for, increased cost, rather than economy, will be the result.

The Way to Save May Be to Spend

HIGH cost of building construction in recent years has caused many railways to postpone the erection of needed additions to their repair shops. It is often a mistake, however, for a railway to be too economical in this respect. Proper maintenance of equipment is one of the prime requisites for successful operation. Any saving which prevents such proper maintenance of rolling stock quite likely will prove bad business.

As an example of the wastefulness of a policy which neglects to provide suitable repair shops, the case of a railway in the Middle Atlantic States may be cited. This company has three buildings in which maintenance work is done. There is the main repair shop, a large carhouse located some 2 miles from the shop, and a paint shop about 4 miles away. Regular inspections and minor repairs are done at the carhouse. For major repairs a car must be sent to the shop. Unfortunately, when a repair job is undertaken, it is not always possible to tell just how serious it is going to be. It has been found, on the one hand, that cars are sometimes sent to the main shop for trivial ailments, occasioning considerable waste mileage, and on the other hand, that repairs undertaken at the carhouse frequently develop into jobs too big to be handled there, resulting in serious loss of time before the car is received at the main shop and real repairs got under way.

The disadvantage of having the paint shop 4 miles away from the mechanical repair shop is obvious. For general overhauling a car is sent first to the mechanical shop, where it is stripped of its equipment. It is then towed 4 miles to the paint shop, where the paint and varnish are removed. Often it happens that after this has been done, some structural weakness is uncovered that was unknown while the old paint remained on the car. In that case it is necessary to notify the mechanical shop and have a carpenter or mechanic with his tools sent over to the paint shop to make the necessary repairs. If the job is more serious than can be done by a single man, the car may have to be hauled all the way back to the other shop, fixed up, and returned to the paint shop. After the painting is done the car must be towed back to the mechanical shop

where the equipment is replaced. The extra expense of so much dead mileage is an important item, and the value of the time wasted, though difficult to estimate, nevertheless amounts to something on the company's balance sheet.

In this particular case the railway owns sufficient property adjoining the carhouse to erect there a new shop in which all repairs and painting could be done. This very thing has been talked of for years, but has been postponed because the railway has wished to economize. It appears, however, in this instance at least, that the way to save money would be to spend money.

Tax Reduction Prospects in New York State

NEW YORK taxpayers were agreeably surprised by Governor Smith's recommendation at the opening of the Legislature that the state personal income tax be reduced by 25 per cent. They were pleased to discover that the Governor believed the state's financial condition justified a reduction in taxation at this time, and it is certainly to be hoped that a reduction will be accomplished. However, it is by no means obvious that the income tax is the place to cut.

The tax system of the State of New York is quite unlike that of the federal government. Whereas, the income tax is the strong right arm of the federal treasury, it is merely a weak little finger in the state system. The main resource of state and local finances is real estate. The Davenport committee has reported to the Legislature that real estate is heavily burdened, and has urged that the state give it some relief by refraining from imposing any tax upon it. In view of the strained finances of many of the municipalities, it may soon be necessary to go even further than this and perhaps increase, instead of decrease, the income tax, the yield of which is shared with the municipalities in order to ease the local real estate taxes.

Moreover, it should not be forgotten that the most acute problem in taxation in New York State is the public utilities tax, especially that on electric railways. The Davenport committee suggested a utility tax based on the elements of both gross and net income, to replace the present series of state taxes and be articulated with the special franchise tax as long as that exists.

It may be noted that lower taxes on real estate will mean lower taxes on the "special franchises" of public utilities, and that a full state treasury may encourage the State Tax Commission to adopt a more reasonable attitude in valuing these special franchises. The loss of the recent proposal for a constitutional amendment to permit a thoroughgoing reform of the public utility tax law should not be made an excuse for refusing to grant such a measure of relief as can be immediately supplied.

The proposal to cut the income tax, rather than the state "direct tax" on real estate, is plainly dictated by political rather than financial considerations. A scheme which would enable each income tax payer to strike off 25 per cent of his bill and consider the saving a personal present from the Governor has very strong political attractions. Every one appreciates the Governor's thoughtfulness in suggesting it, but, critically examined, it proves to be amateurish finance. It is to be hoped that Governor Smith will be satisfied with having in the East displaced Secretary Mellon on the first page for a day, and not urge the proposal further.

Machinery Speeds Up Trackwork

By *W. D. Chamberlin*

Principal Assistant Engineer Market Street Railway

The Presence of Four Parallel Tracks on Market Street, San Francisco, Simplified the Problems of a Big Reconstruction Job and also Facilitated Rapid Progress Without Interruption to Traffic—Grades Were Raised as Much as 18 In. in Some Cases to Compensate for Ground Settling



The Reconstruction Work Included a Distance of 17,760 Ft. of Single Track from the Ferry to McAllister Street

IN VIEW of the fact that Market Street, San Francisco, is badly congested with traffic, both railway and vehicular, the record recently made of reconstructing 5,500 ft. of single track and paving in twenty-five days is considered particularly good. This was only part of a larger job, however, as the reconstruction included altogether 17,760 ft. of single track from the ferry to McAllister Street. Work was commenced in May and completed in December of last year.

Market Street, the main business thoroughfare of San Francisco, is 120 ft. wide and has four parallel tracks, the two outer tracks from the ferry to Sutter Street (4,580 ft. of single track) being jointly owned and operated by the city and the railway. From Sutter Street to McAllister Street there are 8,600 ft. of single track, owned and operated by the city alone. The railway owns the two inner tracks all the way from the ferry to McAllister Street. The recent reconstruction job included the four tracks from the ferry to Sutter Street and the inner tracks from Sutter to McAllister Street.

From the ferry to Third Street, about 12,300 ft. of single track was reconstructed at night. Between 11:30 p.m. and 6:30 a.m. all passenger cars were operated on the outer tracks, leaving the inner tracks free from traffic during those hours. This was accomplished by installing temporary crossovers at several points along the line to allow the cars from the inner tracks to cross over to the outer tracks and back again. Each

day, at 6:30 a.m., the new track was connected to the old so that cars operated on the new track during the day and up to 11:30 p.m.

The average force was about seventy men, not including the concrete gang. The whole night job was handled by this force with the use of a number of labor-saving machines and equipment. The equipment in use consisted of flat-bottom work cars, power-controlled dump cars, a 5-ton crane car, a 7-ton derrick car with a 3,000-lb. drop hammer, pneumatic concrete breakers and tie tampers, an electric bond brazing outfit, a 13-cu.ft. concrete mixer outfit, a special tool for cutting asphalt along the 2-ft. strip, an oxyacetylene outfit and a special crane for loading earth into flat cars.

As the headway was twenty-one seconds between cars during the morning rush hours, it was possible from Third Street to McAllister Street to operate all cars on the outer tracks days and nights, except during the rush hours from 3:30 p.m. to 7 p.m. This enabled work to continue night and day on the inside track construction.

After crossovers had been placed at McAllister Street and at Third Street, the work of reconstructing that section was started on Nov. 12 and the last concrete was laid on Dec. 7. Thus, in twenty-five days, 5,500 ft. of single track was entirely reconstructed and paved, with the exception of one or two blocks of asphalt surface. Although the job was speeded up, it was first class in every way, no hasty or careless work being

allowed. The average force on this job, not including the concrete gang, was about 120 men per twenty-four-hour day, divided into one shift of about fifty and another of seventy men.

The same equipment was used as on the preceding night job, with the addition of an asphalt scoop for loading old sheet asphalt into cars. First the asphalt in the track was torn up and loaded in cars with the scoop. Then a cut $1\frac{1}{2}$ in. deep was made in the asphalt 2 ft. outside of the rails with the special asphalt cutter, which was attached to a car and run at a speed of 300 ft. per minute. After the asphalt had been removed, the 3,000-lb. drop hammer pounded the concrete base, this being followed by three Ingersoll-Rand pneumatic concrete breakers, each operated by two men. By this means the concrete base was broken into sizes small enough to be shoveled into cars. All this work was done during the day, with the exception of the hammer, which operated at night. The night force followed the concrete breakers, pulled up the old rails, ties and some remaining concrete with the 5-ton crane car, after which several carloads of refuse material were hauled each night to the dump, 3 miles distant, where they were unloaded or spread with the car unloader. All old rails were cut with oxyacetylene torches.

Before the day crew arrived each morning, the trench had been partly excavated. The day crew then finished the excavation and laid new track until 3 o'clock each afternoon. At that hour the old and new rails were connected so cars could operate until 7 p.m. All rails were laid with the derrick car, an average of about 275 ft. of single track being laid each day. This work was then followed by the tamping gang with six to eight Ingersoll-Rand pneumatic tampers and the bond brazing outfit. These in turn were followed by men with Vixen files, filing all joints, and then by the concrete

wood ties, spaced on 2-ft. centers, and 9 in. of crushed rock ballast. The paving was sheet asphalt with header blocks along the rails, all on a 6-in. concrete base with a concrete stringer under the rails and blocks. The reason for reconstruction was that the rail, which had



Where the Roadway Was Elevated a Retaining Curb Was Used to Keep Water Off the Sidewalks

been laid in 1909, was badly worn. In fourteen years $\frac{1}{2}$ in. of the rail head had been worn off.

On the new track the trench was excavated 18 in. deep, about 3 in. of the old ballast being removed and replaced with new. Rails designed by the engineering department of the Market Street Railway, of 9-in., 121-lb. section, were laid on 6-in. x 8-in. redwood ties, spaced on 2-ft. centers, the rail joints being the standard 36-in. plate with twelve 1-in. bolts and three concealed brazed bonds. The paving was $2\frac{1}{2}$ in. of Topeka on a 6-in. concrete base and stringer. There are no header blocks along the rails, the Topeka being laid from rail to rail. Header blocks were not used because there is very little vehicular travel along the inside tracks.

An important phase of the work was the raising of the grade of the new track in some places as much as 18 in. above the previous level. This is shown in an accompanying illustration. The continual sinking of lower Market Street, described in the *ELECTRIC RAILWAY JOURNAL* for Dec. 23, 1922, necessitates the raising of the track grade from time to time.

As this job was in the heart of the shopping district, with foot crossings far apart, thousands of pedestrians crossed the open work all along this line, thus greatly interfering at times with the speed of the workmen.

The record made is largely due to the machinery and equipment used, a well-organized and efficient force of men and a thorough co-operation between the various departments, including the city police traffic squad. It is expected that the cost per foot of track will exceed by only a small amount the cost of similar construction on other streets with normal traffic conditions.



It Was Necessary to Raise the Street Grade as Much as 18 In. at Some Points

mixer outfit placing concrete base and stringer. The Topeka wearing surface was placed by a contractor.

All concrete on the 5,500 ft. of single track was cut with three pneumatic breakers in eighteen days, about 39,000 sq.ft. being broken up. All old track and paving was removed and new rails laid in twenty days. The tamping required twenty days. All new concrete was placed in nineteen days, about 54,000 sq.ft. being laid. The Topeka surface, 54,000 sq.ft. in extent, was laid in three and one-half days.

The old track consisted of 9-in., 141-lb. rails on red-

Section Numbers of Trains Are Carried on Dash

WHEN several cars operate as different sections of a train on the single-track lines of the York Railways it is customary to mark each of the sections with a green marker bearing a white cross, except the last section, which carries a small sign reading "Last Car." This system of designation has been found by the company to be more convenient than the use of green and white flags, as is customary on steam railroads and many interurban electric railways.

Getting Best Results with Heater Control Equipment

How to Install, Inspect, Test and Maintain Mercury Thermostat Equipment in Order to Get Best Operating Results and Minimize the Maintenance Expense — This Gives the Methods Recommended as Best by One Manufacturer as Result of Experience on Many Properties

By L. P. Hynes*

IN ORDER to insure the maximum net saving from the use of thermostats for controlling the temperature of electrically heated cars, it is very important that these devices be properly installed and maintained.

A thermostat control equipment consists of two units, a mercury thermostat and a magnetic switch. The proper location of these two units relative to the rest of the heater equipment is shown diagrammatically in Fig. 1. The actual location of these devices in the car is also important. The box containing the magnetic switch should preferably be mounted overhead on a vertical wall of the car vestibule adjacent to the heater switch fuse box, as this simplifies the connections and reduces the wiring to a minimum. It is not a good plan to mount the magnetic switch under a seat on the floor of the car where inspection is difficult. If it is absolutely impossible to mount it in the position recommended, the next best location is in a weatherproof box suspended underneath the car.

The best place for mounting the thermostat is at a point in the car body about 5 ft. above the floor and where it will not receive direct drafts from any source. Ordinarily, it should be placed near the longitudinal center of the car, except on cars having center doors. With a center door the best location is approximately at the midpoint in either portion of the car.

Having determined the best location for the magnetic switch and the thermostat, the wiring should then be done according to the diagram usually supplied by the manufacturer. The proper size of wire for carrying the heater load will correspond to the amperage of the heaters and will vary with different sizes of cars. The size of wire for connecting to the mercury thermostat, however, can always be No. 14 stranded N.E.C. rubber-covered wire. The thermostat should not be attached until the remainder of the installation has been completed and thoroughly tested out. This test can be made as follows:

Inasmuch as the two wires leading to the thermostat are open at that point, ready for connection to the thermostat, the magnetic switch should close the circuit and turn heat current on the heaters. By touching the two wires together the magnetic switch should open and cut off current to the heaters. These wires should be separated and touched together several times to test out the operation of the magnetic switch, before attaching the thermostat in place on the car walls.

It may sometimes happen that when the thermostat

is removed from its packing the mercury column may have become separated in shipment. It can be re-joined by turning the thermostat upside down and tapping it firmly on either the palm of the hand or on a block of wood. With the column thus re-joined, it should be turned back to its normal position with the bulb at the bottom and again tapped to bring the column back to its normal place. With the mercury once in its proper place and the thermometer mounted, the mercury will never separate under any amount of jar in service. It can only be separated when under jar in a horizontal position.

If the thermostat is of the visible type so that the

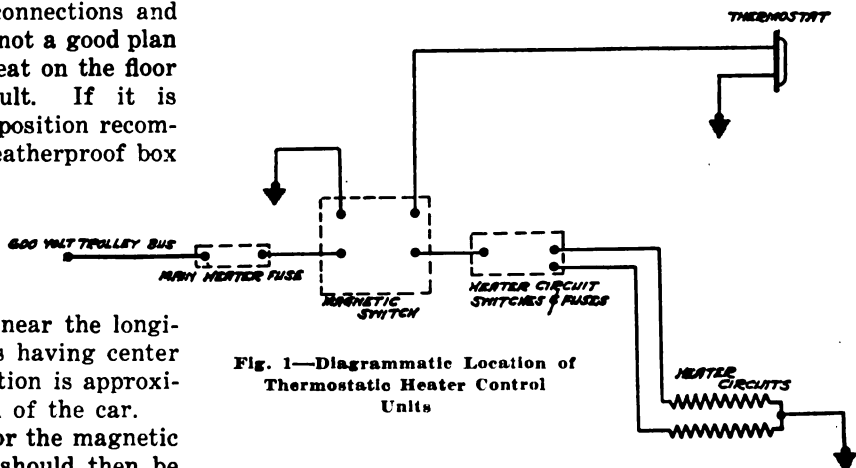


Fig. 1—Diagrammatic Location of Thermostatic Heater Control Units

position of the mercury can be seen at a glance, the above procedure will be necessary only when it is seen that separation has occurred. But if the thermostat is of the non-visible type, the thermometer should always be tapped as indicated above in order to make sure that the mercury is properly joined and the thermometer in working condition.

It is very important to make particularly good connections in attaching the wiring to the thermostat, on account of the extremely low voltage of this circuit. This is one common cause of trouble. The connection should be made by means of substantial through terminals or by soldering. It will not do simply to twist the wires together, as slight corrosion is likely to occur later and interrupt a proper contact. If the connections are properly made, there should be very little trouble in keeping the thermostat control operating.

The magnetic switch box should be locked or sealed to prevent its being opened by unauthorized persons, and the thermostat should be inspected as a part of the regular daily inspection of the car in order to see that it has not been stolen, damaged or disconnected.

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In case any damage to the thermostat is discovered, it should be taken off and replaced with another, as the repair of thermostats is a bench job, to be handled with proper tools and test equipment. Furthermore, this work should be done only by a thoroughly experienced and competent man who understands the principle and operation of a mercury thermostat.

Directions for the testing and repairing of mercury thermostats will be given later in this article.

A mercury thermostat control equipment is a thor-

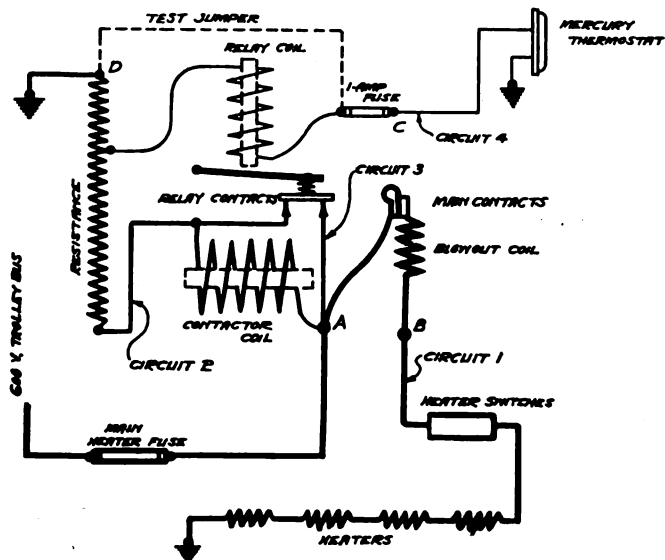


Fig. 2—Diagram Showing the Four Circuits of a Thermostat Control

oughly reliable device when properly handled, but it must be realized that a temperature change of 1 degree Fahrenheit possesses but a small amount of actual power to do work. This small amount of energy must be multiplied sufficiently to operate a reliable and substantial circuit breaker, capable of handling the full heater load under all conditions. This has been well worked out and it is simply a matter of giving reasonable and proper care in order to secure good operating results.

It must be remembered, too, that a mercury thermostat is a glass tube, and no matter how much it is safeguarded and cushioned it must be handled with the same general care that is required for electric lamp bulbs or for meters, gages and other high-class instruments. It is a thoroughly practical device, but it cannot be abused.

GENERAL INSPECTION AND OPERATING TESTS

At the beginning of each heating season the entire equipment should be given a careful inspection and test. In order to do this properly it is necessary for the inspector carefully to study the circuits and understand fully the function of each. Different makes of equipment have somewhat different internal connections, and while some general principles apply in all cases, the inspector should be thoroughly familiar with all the details of the particular installation of which he is in charge.

A mercury thermostat control equipment is always divided into at least four general circuits, as follows:

1. The first is the main heater load circuit, which includes the main contacts of the contactor, the blowout coil, heater switches, fuses and the heaters themselves.
2. The second distinct circuit is the operating circuit of the contactor, which includes the magnet coil and a series

resistance which cuts down the voltage on the coil to a proper amount.

3. The third distinct circuit is a shunt circuit around the coil of the contactor and includes the contacts of the relay. When these contacts are closed, the contactor coil is short circuited and thus de-energized. In some designs this closes the heater circuits, while in others it opens the heater circuits, so that it is necessary to understand the normal functioning of the relay.

4. The fourth distinct circuit is the relay coil and the thermostat circuit. This starts near the ground end of the series resistance circuit. It includes the coil of the relay, the 1-amp. thermostat fuse, the mercury thermostat, then goes to ground. As this shunt circuit is around a small portion of the series resistance, a small low voltage current flows through it whenever the thermostat makes contact. Current flowing through this circuit operates the relay which controls the contactor and thus opens the heater circuit.

Fig. 2 clearly shows these four circuits for a standard Consolidated equipment. Having these circuits clearly in mind, the operation of the equipment is easily understood.

HOW CONTROL FUNCTIONS

When the car temperature is lower than the thermostat setting, the column of mercury is below the upper contact and no current can flow to ground through the fourth circuit. Hence the relay coil is not energized and the relay contacts are kept closed by gravity and firm spring pressure. Current still flows in the second circuit, but as the relay contacts are closed, the contactor coil is short circuited, hence not energized, and the main contacts are closed by a heavy spring.

As a result current flows in the first circuit to the heaters. As soon as the heaters raise the car temperature sufficiently, the mercury column touches the upper contact and current flows to ground through the fourth circuit. This energizes the relay coil and the relay contacts open the shunt circuit (3). Current will now flow through the contactor coil, which will open the main contacts and cut off current from the heaters. When the car temperature falls enough to cause the mercury column to leave the upper contact,

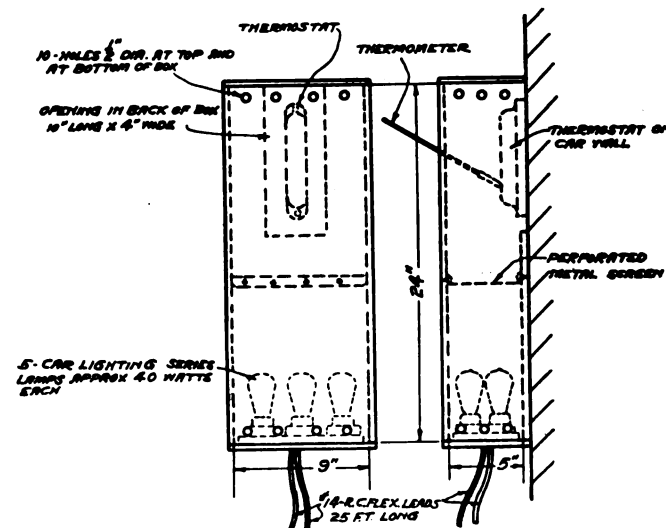


Fig. 3—Box for Testing Thermostats

this will open circuit (4), de-energize the relay coil, close shunt circuit (3) around the contactor coil, de-energize this and allow the main contacts in circuit (1) to reclose, thus restoring current to the heaters.

Having the functions of these circuits clearly in

mind, an electrical test of the main switch panel is very simple.

HOW TO TEST OUT CIRCUITS

Remove the fuse in order to disconnect the thermostat entirely. Apply a test jumper from the live fuse clip to ground terminal *D*, as shown by dotted line in Fig. 2. This should cause the relay contacts and the main contactor contacts to open. Remove the jumper and both contacts should close. If the operation is

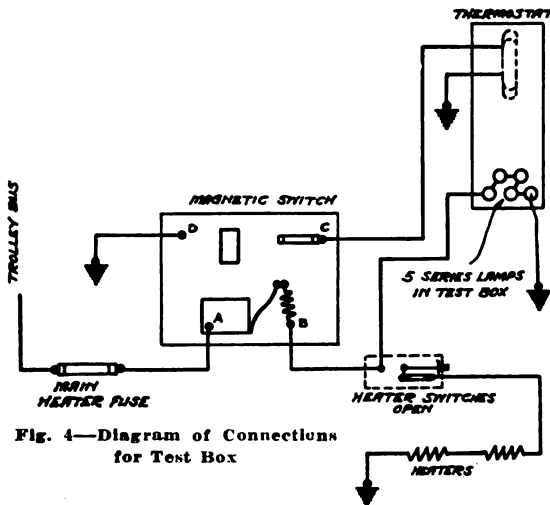


Fig. 4—Diagram of Connections for Test Box

satisfactory, throw in the heater switches and note the action of the contactor under full load by repeating the tests. If satisfactory, test the fuse for circuit and replace, making sure it fits well in the clips to insure good contact. Examine all connections and inspect the contactor tips. These should have a gap of about $\frac{1}{8}$ in. when open and should wipe in closing. The armature must pivot freely to insure snappy action. The relay contacts are of substantial size and of metallized carbon, which insures against relay trouble. The contact gap should be $\frac{1}{8}$ in.

If any of the above tests are not satisfactory, it will be an easy matter to locate the trouble and remedy it.

Local tests of parts of the various circuits can easily be made with a magneto, but the mercury thermostat itself must never be rung through, as the high voltage will damage the mercury column.

Having tested the main switch, the mercury thermostat should be tested. This requires more care and can only be done under proper temperature conditions. The only way to test the thermostat is actually to raise and lower the temperature surrounding it, so that normal variations in air temperature are produced. It is difficult to make tests by artificially lowering the temperature, so that this test should be made when the weather is considerably colder than the temperature for which the thermostat is set. The thermostat can then be easily tested by means of a test box as shown in Fig. 3.

This is simply a light wooden box about 3 ft. high by 2 ft. square, set up in a room free from strong drafts. A bank of lamps can be used at the bottom of the box for heating, but one or two perforated metal screens should be placed above the lamps in order to diffuse the air current so that it will produce a uniform temperature in the upper part of the box where the thermostat is mounted. A few holes should be bored in the bottom compartment containing the lamps and also in the top of the box, to allow a gentle circulation of air up through the box and out. A standard thermom-

eter known to be correct should be inserted through a hole in the top of the box, so that its bulb is close to the bulb of the thermostat under test. The thermostat should then be connected to a regular magnetic switch, properly connected to control the current on the bank of lamps in lieu of the car heaters. The connections for this test box are shown in Fig. 4.

When the current is first thrown on a test box of this kind, it will take a few minutes for the temperature to become equalized. The test of the thermostat should therefore not be made until after the thermostat has been automatically cutting the current on and off the lamps a number of times. After this, a test will disclose the true range of temperatures between which the thermostat operates.

While this test does not exactly duplicate car conditions and hence does not give exactly the same temperature ranges, it will show temperatures near enough to determine definitely whether the thermostat is operating properly. The car temperature for which the thermostat is set and marked should be about half way between the upper and lower temperature limits indicated in this test.

If the thermostat does not operate properly, it should be loosened from the wall and the connections examined. It may be that poor connections have been made, but if no trouble is discovered here the thermostat should be entirely disconnected and a test of the equipment made by touching together the two wires. When these are put together, the main switch should be opened and the lamps in the test box should go out. When they are separated the main switch should close and the lamps in the test box should light. If this does not occur, there is some fault in the wiring between the main switch and the thermostat or between the thermostat and ground, and before making any further thermostat tests it is essential that proper operation be secured by touching these wires together.

If this test indicates that everything else is all right, it is certain that the trouble is in the thermostat itself. This should now either be replaced with another thermostat known to be in good condition or the thermostat cover may be removed for examination.

Perhaps the mercury column will be found separated. If so, it is a very simple matter to rejoin it, as already told. If the column runs freely back and forth, the thermostat is absolutely all right and should be re-applied, as it will give just as good service as a new one. If the mercury column does not run freely, it is very likely the vacuum has been destroyed through the tube being cracked or spoiled by improper connection on high voltage and a new tube is necessary.

If the column has been rejoined properly, the circuit wires should be connected to the thermostat while the cover is removed, and by blowing on the bulb or warming it gradually by any other means the column can be raised until it touches the upper contact. This should cause an operation of the switch. If it does not, the thermostat should be removed for a careful bench test and a new one applied and tested. If the equipment is sent out in proper condition no trouble need be anticipated during the entire season unless some external cause, such as tampering, interferes with it.

Contrary to a general impression, separation of mercury does not happen in service unless something is wrong with the installation which allows a high voltage to pass through the mercury, or the tube has become

cracked so as to allow air to get into it. Under proper conditions neither jar nor normal service will separate a mercury column. A mercury thermostat must have a perfect vacuum for proper operation.

Thermostat repairs should be made by a man who is a good mechanic on fine work. The tube should be carefully examined to determine if there are any cracks which destroy the vacuum. If the tube is cracked it cannot be repaired. On the other hand, the trouble may simply be due to a broken connection. It will be noticed that where the platinum contact comes out of the glass tube, the tube has been banded with fine copper wire which is soldered into a ring to which is soldered the flexible lead wire. If this lead wire has become detached it can easily be resoldered with a small hot iron, the soldering being done quickly to avoid heating of the tube. If it is done properly, the heat will not crack the tube.

A thermostat should never be tested for circuit with a bank of lamps, with a magneto or with a dry battery. The lamps give too much voltage and current, the magneto gives too much voltage and the dry battery, while of low voltage, gives too much current. In any case the mercury column will be damaged. The only proper way to test a thermostat is by connection to the proper terminals of a standard magnetic switch such as would be used on a car, or to a special test set furnished by the manufacturer of mercury thermostat equipments. Bare thermometer tubes can be tested by standing the bulb in a cup of water with a standard test thermometer. Warmer or cooler water should be slowly added and constantly stirred until contact is made or broken. Thermostats mounted in cases should be fastened to an upright board and tested with the box described in Figs. 3 and 4.

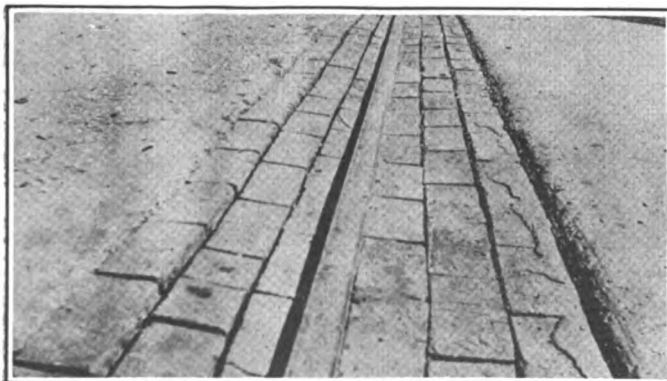
Hot Asphalt Filler Prevents Pavement Bulging*

ON THE city lines of the Northern Texas Traction Company, Fort Worth, a large amount of the track is paved with creosoted wood block headers. In the past, during the dry spell, the creosote sometimes has evaporated from the wood blocks, leaving them entirely dry. When it rained the block would swell and bulge upward, making the pavement uneven and dangerous.

After some study the company overcame this trouble by the following treatment:

As soon as a creosoted block shows signs of drying

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

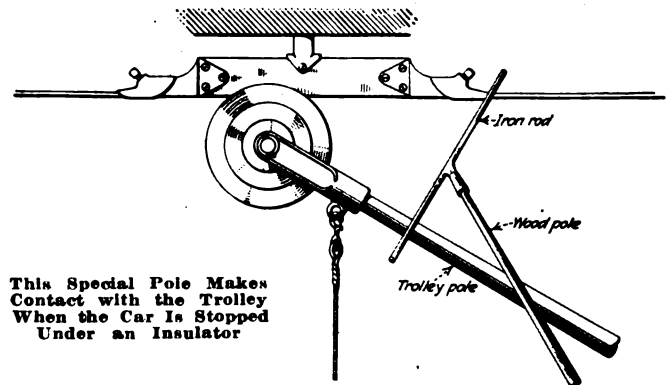


out, the paving gang blows out by compressed air all dirt between the blocks. The cracks between the blocks are then filled with hot asphalt and the surface is covered with the same material. On top of this is spread chat or finely ground rock.

Such treatment of the wood block headers has completely waterproofed them and has eliminated the trouble due to swelling of the blocks. Moreover, it gives a smooth finish to the header paving and has resulted in a large saving in the maintenance cost.

T-Pole Furnishes Current to Stalled Cars

SECTION insulators are often placed at the entrance to terminals, shops and carhouses. Cars habitually enter such structures at low speed and not infrequently stop with the trolley wheel resting on the section insulator. If another car is near at hand, the stalled car can



be pushed beyond the dead line. But there may be no other car handy, and it may be impossible to establish connection between the trolley pole and a live portion of the overhead wire, as the pole will strike against the wall if an attempt is made to raise it and get contact with the wire at some other point.

As the result of numerous such experiences at its Newark terminal, the Public Service Railway has equipped each track with a specially designed pole. It has a long wooden handle with an iron crosspiece securely fastened to the upper end. When a car becomes stalled on a section insulator at the entrance to the terminal it is only necessary for the conductor to alight from his car, and by means of the crosspiece on the T-pole re-establish connection between his trolley pole and the overhead wire. The simplicity of this apparatus makes it inexpensive and much time has been saved.



Dirt Is Blown Out Between Pavement Blocks and Asphalt Applied to Waterproof Them.
The Top Surface Receives a Covering of Chat After Asphalting

Paving Troubles Along the Rail

Various Causes of Failure of Bond Between Paving and Rail Under Traffic Are Discussed and a Method Is Suggested for Permitting Rail Movement While Preserving the Bond and Strengthening the Paving Edge

By *W. S. Godwin*

W. S. Godwin Company, Inc., Baltimore, Md.

RESPONSIBILITY for railway paving construction and maintenance is, in the majority of cases, fixed by the franchise under which the railway operates. Regardless, however, of who is to pay the bill, common sense and economy would dictate a character of track and paving construction designed to meet the strain of present and future traffic.

There are certain adverse conditions affecting paving in contact with rails which must be met and overcome. Of these, one of the most important is the rail movement. Some movement of the rails under traffic is not only unavoidable, but, from the standpoint of a large percentage of the railway engineers, a desirable condition. Nevertheless, it marks the beginning of paving trouble. Rail movement, no matter how slight, breaks the bond between the rail and any kind of paving or liners which may be used. The break soon widens to an open crack. The necessary side support to the paving is destroyed; seepage occurs and disintegration of paving and base starts. The amount of rail movement affects the speed with which the paving disintegrates. It is always more rapid at loose joints, and at crossings and switches, where there is a heavier car impact and weaker paving, due to the corners.

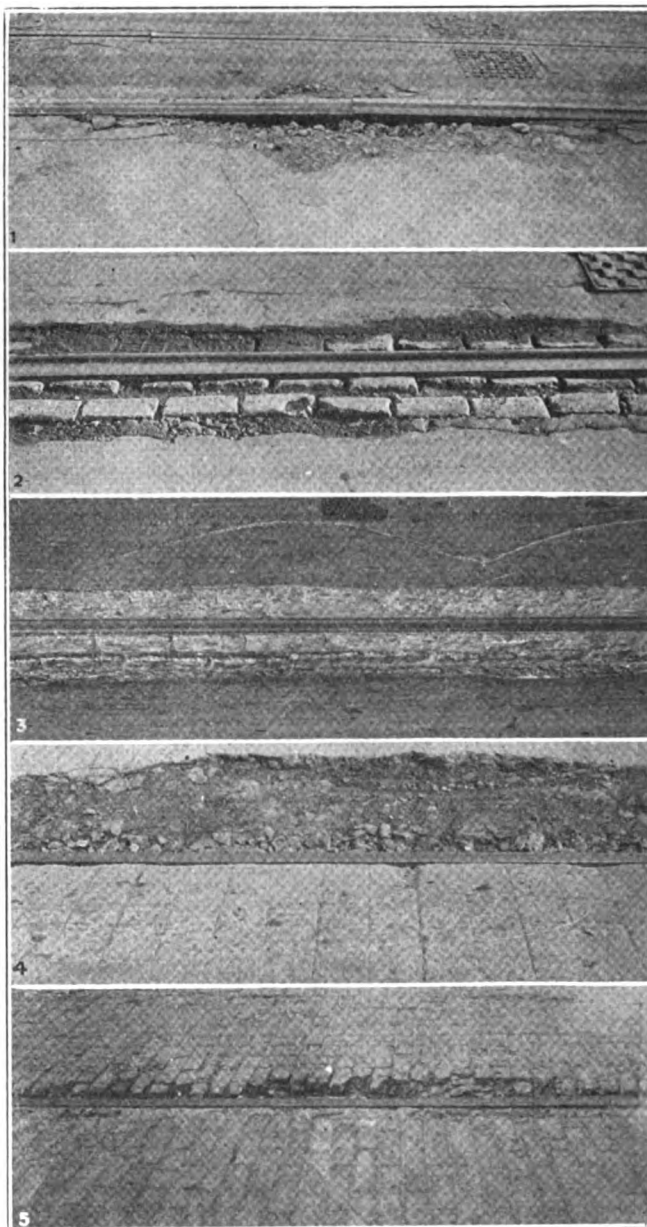
Tests and service have proved conclusively that failures occur first at the edges and corners of any paving slab. In wood cross-tie construction, with no concrete below the ties, there is an edge on each side of each rail. These edges break down under highway traffic and this structural weakness of paving is intensified if the concrete is made sufficiently thin to accommodate block liners. Seepage of surface water between the rail and the paving weakens the sub-base, which allows the ballast and cross-ties to settle. Freezing and thawing of seepage water also cause disintegration by heaving the paving surface and base.

An additional difficulty arises from the use of several kinds of material. The different materials appearing at the surface of street railway paving are steel, granite, concrete, brick, wood and asphalt. Each wears at a different rate, with a resulting break in the smooth continuity of the paving surface. As soon as the weaker wears below the stronger there is a drop and the impact of highway traffic quickly forms low places or ruts. It is not unusual to see three or four materials in the same railway area—brick, steel, granite and asphalt.

The most efficient, economical and durable type of street railway paving, then, is paving which will permit rail movement, paving which possesses permanent edge strength and rigidity, which prevents seepage, and in which the different kinds of material have been kept to the very minimum.

In designing the proper type of street railway paving, railway requirements must be met as well as traffic needs. Track structures should be designed and

built to withstand the maximum car loads, plus a liberal amount for safety. The majority of engineers advocate resilient tracks for one or more of the following reasons: Economy in upkeep of rolling stock; minimum noise from car traffic; material increase in life of rail.



No. 1. Disintegration of asphalt against resilient rails.

No. 2. Granite block liners dislocated by rail motion and frost action.

No. 3. Surface cracks indicating similar breaks in concrete base caused by highway traffic. Asphalt along second row of liners raised by loose blocks.

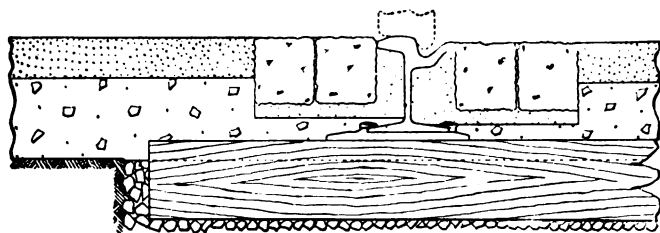
No. 4. Concrete paving disintegrated by seepage resulting in frost action through the flangeway.

No. 5. Brick paving loosened by rail movement and broken down by highway traffic.

The ideal track structure appears to be one with a continuous and uniform bearing. The bearing should have a uniform and controlled resiliency.

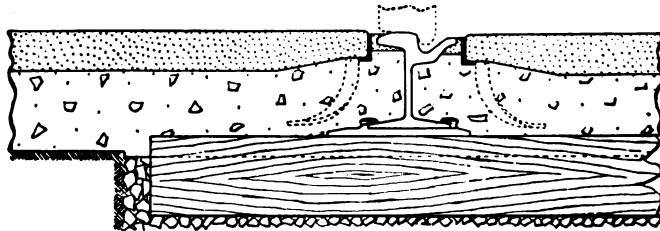
Asphalt paving immediately against the rail has been used to a small extent in nearly every section of the country, only to be promptly discontinued. At this time not more than 2 per cent of the paved track mileage has asphalt against the rail. This character of paving is plastic in high temperature and brittle at normal and low temperatures. Rail movement and contraction of the asphalt in cold weather open a crack along the rail which is gradually enlarged by chipping away caused by the moving rails and highway traffic. In warm weather, traffic mashes unsupported asphalt into ruts.

Because of these conditions, asphalt against the rails is not a durable paving construction. The customary practice of paving contractors of adding 5 per cent to their bids whenever a maintenance guarantee is required on this class of paving provides an interesting



Usual Granite Block Liner Construction Showing Shallowness of Concrete Between the Tie and Liners

Longitudinal Section of Concrete Between Granite Liners and Ties Adjacent to Rails



Method Recommended by Mr. Godwin for Obtaining a Strong Shoulder Adjacent to Rail

Longitudinal Section of Concrete and Steel Paving Guard Between Asphalt and Tie, Adjacent to Rail

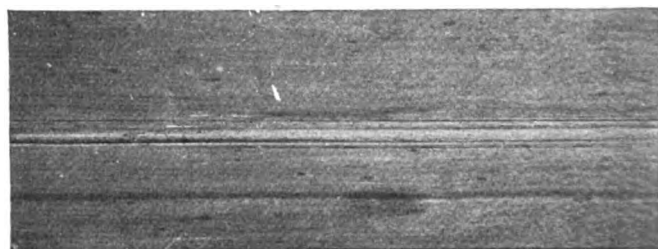
sidelight on its upkeep cost. Two course paving—concrete base, with a surfacing of asphalt or other material—requires a base sufficiently strong to carry the weight of highway traffic irrespective of the surface material, which is only intended to take the wear. The base must be as strong at its edges as elsewhere. The surface or wearing material should have a smooth continuity of surface to prevent impact and a rigid side support to prevent chipping of brittle paving and flowing of asphaltic materials. In one course paving, cement concrete takes the wear and the load direct.

Many millions of yards of 6-in. concrete base are successfully carrying the present loads in streets without tracks. When this same base is adjacent to the rails it usually fails, and it is a wonder it does not fail oftener when it is known that the edge of a slab is considerably weaker than those portions away from the edge. Block or brick liners along the rails still further weaken the edge, as it is necessary to have less concrete to accommodate these blocks and the sand cushion.

When liners of granite, brick and concrete are used between the rail and asphalt paving to form the necessary "rigid" side support for the asphalt, they defeat their own purpose. Both the car and highway traffic loosen them, as the liners themselves have no rigid support on either side, and there is not sufficient concrete between the tie and the bottom of the block to support them. If they are not loosened by the moving rail or motor truck, frost action lifts them and disintegrates the concrete below them, allowing them to drop. Some railway engineers claim that liners can be removed and replaced, for rail repairs, cheaper than any other material along the rails. This may be true, but the initial saving on the original paving, and the additional saving on the upkeep cost of properly protected edges will be many times the occasional cost of repairs to the modern track.

MONOLITHIC BASE AND PAVING DESIRABLE

Combining the paving and track structures to function in unison should be the definite aim of both municipal and railway engineers. As it is not usually desirable or practical for any great length of time to have rigid rails, it is only proper to provide for this movement of the rail by making the paving independent of the rail. A scheme for doing this has been developed by the W. S. Godwin Company, Inc., by using a rigid strip of steel set securely in the paving, as illustrated in an accompanying drawing. This steel paving guard then be-



Asphalt Paving Protected from Rail Movements by Steel Paving Guards

comes a part of the paving. Asphaltic waterproofing material used between the rail head and the steel guard should be sufficiently flexible to allow rail movement and also prevent seepage and its resulting damage.

Through the use of the steel guard, the number of different materials on the paving surface is held down to the very minimum. Two only—steel and any surfacing material—are represented in this character of construction. The smooth continuity of paving thus secured materially lessens the destructive damage of highway traffic shocks. The rigid, permanent side support for the paving along the rails prevents flowing, cracking of the asphaltic surfacing and chipping of the rigid surfacing.

The final step in the development of an enduring paving construction is to overcome the weakness of the paving edge. The logical remedy for weak edges is to strengthen them until they will support any highway traffic without fracture. This condition is recognized by highway engineers, who are now increasing the thickness of the paving slab in addition to reinforcing the edge with steel. If the edges adjacent to the rails are strengthened in the same way and rigid side support provided for the surface of the paving, the edges will not disintegrate. The asphalt paving, or any other paving material, being spaced away from the rail and the edge protected, cannot be chipped or shoved under by

car or highway traffic. If wood cross-ties are used (with concrete below the ties) the concrete between the rails should be an independent slab, thus allowing for the rail or tie movement.

If the rails and surface paving rest on the same concrete slab, its strength should be sufficient to withstand the electric car and motor truck traffic at all points. The customary thickness for concrete base be-

tween the top of the ties and the surfacing material, using the usual 7-in. rail, is not sufficiently strong. Standard sheet asphalt allows only 4 in. of concrete, brick allows 3 in., while with granite blocks there is only 1 in. concrete base under the liners to support traffic at a point where the shock and stress reaches its maximum severity. In many cases this is found insufficient and the paving gives way.

Car Inspection and Testing in Berlin

A Number of Simple Methods Are Described by Which, with a Voltmeter and Battery, It Is Possible to Test the Electrical Equipment of a Car for Short and Open Circuits and Other Faults and Failures

By E. Kindler

Chief Engineer Berlin Street Railway System, Berlin, Germany

FREQUENTLY the maintenance of the electrical apparatus, the motors and the connections on street railway cars is imperfect because members of the shop force are not sufficiently familiar with the physical and electrical details. Some of the workmen regard the connections as a maze of wires and consequently are helpless in case of a fault. In order that the men will understand thoroughly the methods of testing and the reasons for their use, the Berlin Street Railways conducts a regular shopmen's course in which the mechanical and electrical details of its cars are explained in a popular manner with the assistance of special models.

The regular testing and inspection practice which is explained in this course is based on the standard method for street railways of the Verband Deutscher Elektrotechniker. The methods are standardized, and in general are applicable to any electric railway. In the following paragraphs some of the more important methods, as worked out in Berlin, are described:

ANTICIPATING FAILURES BY RESISTANCE MEASUREMENTS AND INSULATION TESTS

In the regular inspection program for the cars, resistance measurements are made every four weeks on the motors, resistors, electric brakes, etc. These individual measurements are entered on cards for each car so that they can be compared with the previously determined resistance of the part. Spaces are provided for four separate tests, and as the card is printed on both sides, the record can be continued on it for thirty-two weeks. Any change in the resistances is evident, so that its cause can be investigated and removed, thus forestalling possibility of failure on the road.

ELECTRICAL FAULTS

Electrical faults likely to occur in the apparatus and cables include insulation trouble, breaks, shorts, wrong connections, loose contacts and motor faults. In the lightning arresters shorts or grounds may be present. On motors there may be, in addition, insulation troubles, burnt-out coils, shorts in the winding, shorts in the commutator, etc.

All these faults may have a more or less serious effect on the operation of the car in general or the motors particularly, hence it is very desirable to locate the trouble when it is developing.

Resistance measurements are made by means of a specially designed apparatus, called the "resistance key," which gives the resistance directly in ohms over a range from 0 to 20. The connections are shown in an accompanying figure. The resistance R_i is measured between the two testing points and its value is directly indicated. The apparatus is used for checking resistances in the car at regular intervals, and also for exact determination of a fault.

The *modus operandi* of these tests is described in the following: Cables, terminals and controller fingers are all designated by letters, such as,

T for the cable from the trolley to the controllers.

R for the cables from the controllers to the resistances.

A_1, AA_1 for the armature cables of motor No. 1.

F_1, E_1 for the field cables of motor No. 1.

A_2, AA_2 for the armature cables of motor No. 2.

F_2, E_2 for the field cables of motor No. 2.

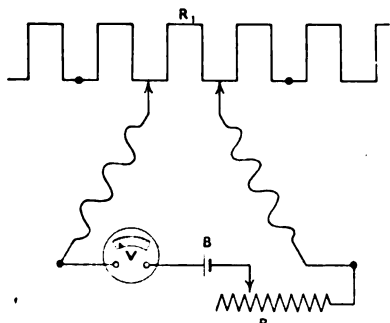
G for the ground cable.

As all cables, with the exception of the lightning arrester cables, lead to the controllers, all measurements may be made from there as follows:

The trolley pole is first lowered from the trolley wire and the light circuit fuses are taken out. After the controller casing is opened the controller fingers, which represent the ends of the cables, are accessible. From here the resistances of the resistor steps are measured on the R fingers. R_1, R_2, R_3 , etc., and the measurements are checked with the tabulated standard values. Then the armatures are measured on the fingers A and AA of the reversing drum, and the field coils on the fingers F and E . As the resistance of the carbon brushes is not negligible, the measurements taken of the armature resistance will not check exactly, so that it is desirable to measure the armature resistance also on the commutator. It should also be remembered that hot armatures, just coming out of service, will show a higher resistance than if they were cool. The principal point to determine, however, is that the measurements are about the same for both armatures and not higher than from 8 to 10 per cent above the standard value. On motors with commutating poles, the auxiliary fields are measured with the main fields. When the resistance of field coils on the pole pieces is taken, it will be noticed that the pointer on the meter moves very sluggishly and does not indicate the real value until after

a certain time. This is due to a very pronounced induced counter emf. in the coils, which, however, soon disappears. The resistance of the field coils should be the same for both motors.

To measure the resistance of the cables between the trolley base and the *T* finger on the controller, one of the lead wires of the meter must be extended to reach to the trolley base. The greater resistance of this lead



Connections for Testing with Ohmmeter

can be compensated for by changing the resistance shown in the diagram as R_2 so that the pointer comes to zero. If now a measurement is made the current will flow from the trolley base, through choke coil, circuit breaker, hand switch and fuse to the *T* finger. The remaining measurement is from trolley to lightning arrester, from lightning arrester to *G* and from *G* to motor casing and controller frame. All these latter measurements should give 0 ohms.

Of course these measurements must be made from both of the controllers and must give values that correspond very closely.

It should be mentioned that on the second controller the armature cables are reversed to give opposite motion, so that cable A_1 is on terminal AA_1 , and AA_1 is on A_1 . The same holds true for the second motor.

FAULTS AND HOW THEY MAY BE FOUND WITH THE OHMMETER

Breaks.—The first kind of fault to be considered is a break or open circuit. There are two kinds which should be distinguished. One is where the circuit is completely open and the other where the open circuit occurs only at certain controller positions. Complete interruption may mean a break in the line from trolley to *T* finger, so that the car does not start from either controller, provided the break is between the trolley and the point where the wiring branches from the main circuit to the controllers, but it is in only one controller if the break is between the junction point mentioned and the dead controller. A complete break may also be due to loose cable terminals or a loose ground connection.

A partial open circuit will occur if a resistor grid is broken or some of the motor connections are open.

Breaks may be located quickly as follows:

First, it should be determined whether the fault is apparent when the car is started from both controllers. If the car does not start on points 1 or 2, the controller should not be turned further with the current on, because there will be a sudden start on later points on the controller and the motors may be damaged. If the fault is observed from one controller only, the trouble lies either in that controller or in its connections. If the car does not start from either controller the fault is not in the controllers but in the resistances, motors, connections or switches.

After the trolley is pulled down to disconnect the car, one of the controllers should be turned to point 1, and the values of the resistances between the following fingers should be determined: $T-R_1$, R_1-R_2 , R_1-A_1 , A_1-E_1 , E_1-A_1 , A_1-E_1 , etc. If the pointer of the meter does not

move when the meter is connected between A_1 and E_1 , it shows there is a fault in the motor, and measurements should be made of armature and field, to localize the fault.

An open circuit may also be indicated when the car starts with a sudden jerk, as that may mean that one of the *R* cables is broken. This can be located by measuring the individual steps on the controller. In that case it will be found that some two consecutive steps will not give any indication on the voltmeter. Thus if cable R_1 is faulty R_1-R_2 will indicate, R_2-R_3 and R_3-R_4 will not, but R_4-R_5 will. This shows that the grid resistors are all right, but cable R_1 is broken. If R_2-R_3 does not indicate, it means that the grid is broken, or else cable R_2 is also faulty.

Short Circuits of Lines.—There are several causes of short circuits. Two cables which should be insulated from each other may become metallically connected, possibly through chafing on the brake rigging. A cable may become grounded, or resistors or motors may develop internal grounds. The results of shorts in the case of any cross-connection between the *T* line and the *G* line are that a heavy current will pass through the car wiring, burning out the fuse or opening the automatic breaker. The same will happen if the motor cables from motor No. 1 are grounded, or if the second motor has cable shorts, which will give the motor No. 1 full voltage on the fifth controller position. A cross-connection between two resistor cables will cause a more or less jerky start of the car on the first position of the controller.

Any kind of a short-circuit is hard to locate, because it shows itself at so many places. If, for example, it is in one of the controllers, it will show itself also in the resistors, in the other controller, on the motors, etc.

A short circuit may be located by testing with the ohmmeter as described. If there is, for example, a connection between two resistance cables, say between R_1 and R_2 , it will be found by the ohmmeter showing no resistance between these points. If the connection is between R_1 and R_2 , the resistances R_1-R_2 , R_2-R_3 , R_3-R_4 , R_4-R_5 will be normal but R_1-R_3 and R_1-R_4 will be low and R_1-R_5 will be zero—in fact, every time there is an *R* short circuit the sum of the resistances will be smaller than the nominal value proportionally to the number of bridged resistances.

Wrong Connections.—Wrong connections may occur if motors, resistors and controllers are wired in a way differing from the approved connection diagram.

If measurements of both controllers show a fault in only one, the trouble is in that section of the wiring, but if the fault is found in both controllers it means a wrong connection of the motors or resistors. Thus if the direction of rotation of the two motors is opposite, the car will not start, and a large arc will occur in the controller on starting. If the individual motors are tested, the wrong connection can easily be found. The tester can then determine whether the fault is caused by a wrongly connected armature or field, or whether it lies in the controller or the motor.

If the wrong connection is in the resistor, say by an exchange of R_1 with R_2 , the car will start with a sudden jerk on point No. 1. Or if R_1 and R_2 are reversed, the car will start with a sudden jerk on point No. 3. A test with the ohmmeter in this case will quickly disclose the point of trouble.

Loose Contacts.—If current passes through a loose connection, its magnitude is changed constantly, due to the vibrations of the car during its run. This may

cause very detrimental current surges in the motors. Such loose contacts can also easily cause arcing, with subsequent complete open circuit, a ground or cable fire. Poor joints, such, for example, as negligently soldered terminals, are responsible for these same troubles in minor degree. With the ohmmeter such loose contacts show themselves in too high resistance readings or vibrations of the pointer.

Internal Motor Troubles.—These can be measured and located without opening up the motor. Field coil troubles may be diagnosed as to whether they are in the upper or lower half by opening the field coil connection between the upper and lower halves of the motor and then measuring the resistance of half of the field circuit. Thus, the measurements may show as follows:

	Nominal	Measured	Diagnosis
Four coils	0.74	1.2	} Fault in lower coils
Two upper coils	0.37	0.38	
Two lower coils	0.37	0.82	

If the brushes spark the trouble may be from faulty brush-holders, wrong brush position, improper brushes, or faulty armature or field coils. If one field coil is wrongly connected, it may cause the motor to have three poles of the same polarity and one of the opposite polarity. This will result in a very high current at medium load of the car, with burning out of fuses or coils.

SUMMARY OF FAULTS

Breaks.—The car does not start at all, or, if an *R* cable is broken, with a jerk when the controller handle is turned.

Short Circuit.—If *T* and *G* cables are cross-connected, an arc is formed when the trolley voltage is put on the system. If one of the motors is shorted, the other one will get full voltage on the fifth step of controller. If *R* cables or resistors are cross-connected, there is a jerky start on the first point of the controller.

Wrong Connection.—On motors, this means an opposite direction of rotation; on resistors, it means jerks on any one of the controller steps.

Loose Connections or Loose Contacts.—Are followed by current surges, arcing, cable fires.

Motor Troubles.—Are caused by faulty field coils, brushes, commutator segment connections or coil connections.

INSULATION TESTS

The electric current has the tendency to return to its source at the power station. If it follows its prescribed path, it is forced to produce work. But it tries also to find its way back to ground along unintended paths. If the insulation of the cables is in good condition no appreciable stray currents will occur on the car. But if the insulation is impaired by dirty or salt water or carbon, metal or other dust, the stray current may be increased, particularly where the insulation is weakened. Then more current will follow, causing sparks, arcs, and finally fire. It is therefore necessary to test at intervals the insulation of the car equipment. Preferably this test should be made just after the cars have come to the carhouse after a rain.

These insulation tests are made with a voltmeter bearing an ohm scale for a voltage of 550. Before the test is started, all ground connections on controllers, motor casings and light circuits must be opened. The voltmeter is then connected in between trolley wire and trolley pole and one of the controllers is moved to a running position. In the "off" position

the instrument should read not lower than 600,000 ohms, and with the controller on a running position, not lower than 50,000 ohms (after a rain). If a fault is found in the insulation the equipment of the car must be gone over in sections.

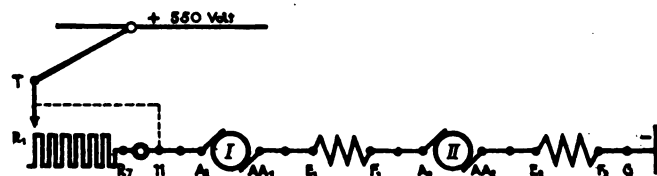
After such a complete insulation measurement, care should be taken to reconnect the grounding cables properly.

FAULTS ON THE LIGHT CIRCUIT

The usual causes of light-circuit faults may be enumerated as follows:

Loose connection on switches, fuses, plugs or sockets; open circuit on the switch, or at the contacts of the sockets, or at the branch point of the main cable, or at the ground connection, or in the light circuit itself.

If one or several of the lamps in a series do not burn, a metallic connection exists between some of the wires, or in the wires of the power circuit or with some grounded metal part on the car. In such a case the remaining lamps will get over-voltage and their filaments as well as the light fuses will soon burn out. Faulty light sockets, as where the center contact



One Testing Lead Is Connected to the "T" Finger and the Second to Other Points in the Circuit

spring comes in touch with the outer metal thread, or where there has been a collapse of the filament wires within one lamp, may have the same result.

To Localize the Fault.—The voltmeter should be connected between trolley wire and pole after all lamps have been removed and the main power switch opened. Then one lamp after another should be inserted, beginning at the positive pole, and the instrument observed until the critical point is reached. The total insulation during this procedure should be at least 200,000 ohms.

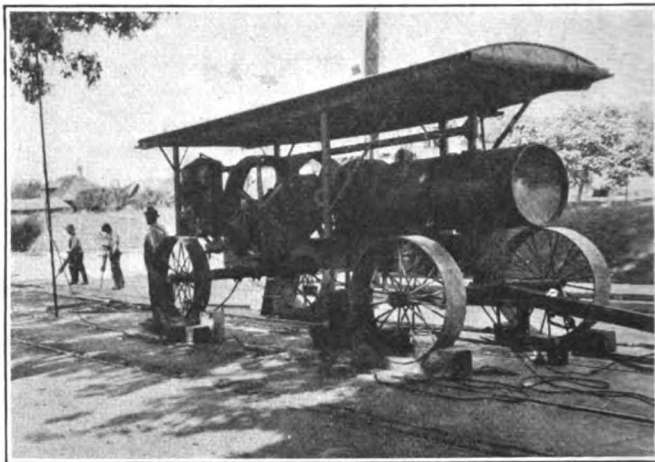
GROUNDING TESTS

All metal parts of the car should be grounded. This means, chiefly, in German cars, the controller casings, vestibule roofs, grab handles, car steps, rain troughs and main frame members of the car. The ground connections for the motors, light circuit and the controller casings should be at easily accessible points, so these grounds may be readily tested. This test can be made with a lamp bank or with a magneto.

Information for Passengers

THE Boston Elevated Railway has recently introduced two new methods for supplying its patrons with information desired by them. It has given public notice that if a person calls "Information, Back Bay 1800" on the telephone at any time, day and night, he can obtain any information desired about car or train service.

In addition, an information booth has been installed at Park Street subway, where detailed information is available, and where attendants are on duty to answer questions pertaining to the service. From 7 a.m. to 11 p.m. inquiries average approximately 1,800 daily and have been as high as 170 in a single hour.



Removing 7-In., 70-Lb. Rail from Pavement by Channelling with Compressed Air Drills. At Right, Type of Air Compressor Used by the Track Department, Spokane United Railways

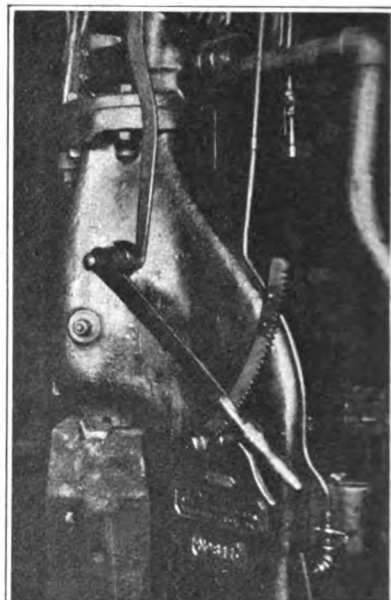
Track Rehabilitation in Spokane*

The Methods Employed Include Revamping of Joint Plates and Some Special Trackwork Manufacture—Reduced Costs Result of New Practices

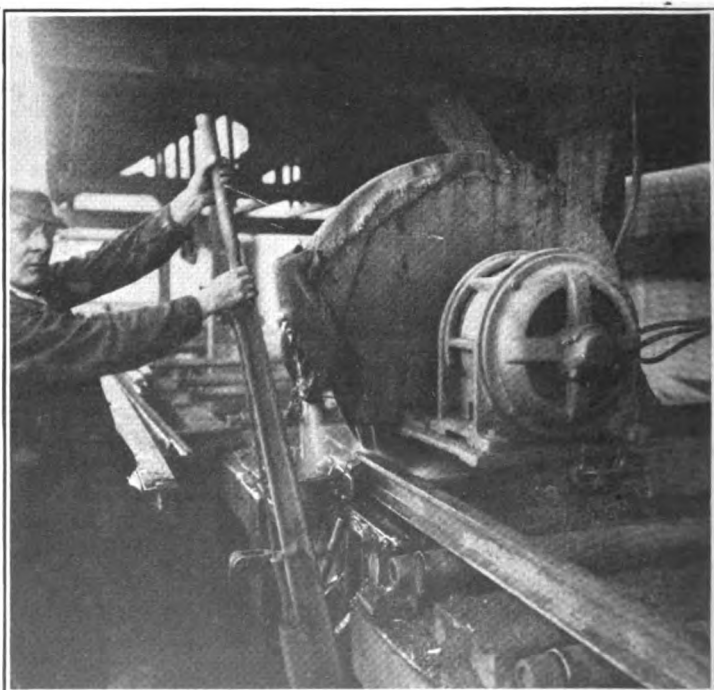
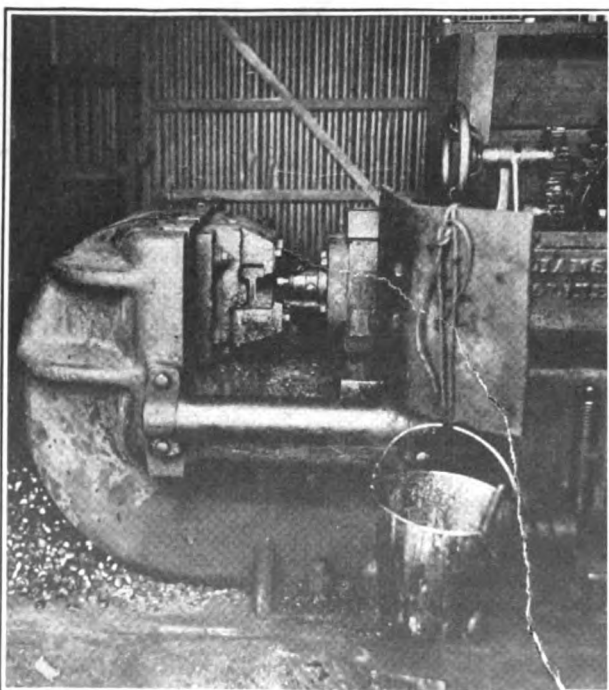
THE Spokane City Railway and the lines in Spokane of the Washington Water Power Company were consolidated on July 1, 1922. Such a step naturally meant a pooling of the equipment and stock, and the inventory showed that the consolidated company had a large amount of rail to dispose of. There was also a considerable amount of outlying track to be rebuilt and a large amount of rail to be sold as relayers. As this rail had no angle plate, the company decided to re-form a supply of angle plates which it had on hand to fit this rail. A powerful air hammer in the shops of the company made this possible. Dies for this hammer were

manufactured for the three different types of 56-lb. to 60-lb. rail, used on the outlying lines in Spokane.

As shown in the illustration of this hammer, it hits the plate only on the edges, spreading it but not lengthening it perceptibly. The plates before going to the hammer are heated in a Fagot forge, and it is found that the re-vamped joints set up perfectly with proper clearance between plates and



Air Hammer Re-Forming Angle Plates



Rail Bender Used as a Rail Punch. At Right, Friction Saw for Cutting Rail

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

rail web. The hammer has also been used to reclaim worn angle plates.

Two other accompanying illustrations show the method of taking up old track by cutting channels in the concrete pavement with heavy-duty direct-current No. 25 Ingersoll paving breakers. They are supplied with air from the portable air compressor, mounted on a special body and broad-tired wheels.

For its heavy-duty frogs, switches, mates and crossings, solid manganese is used. The company, however, makes up some of its lighter special trackwork. For this use rail is cut with a Ryerson friction saw, shown in another of the illustrations. This saw is driven by a 52-hp. alternating-current motor, and since its installation in August, 1922, shortly after the consolidation, it has been used to cut off the ends of more than 1,000 tons of rail, including 56-lb., 60-lb. and 7-in., 70-lb. rail. It has also done a great amount of cutting for the machine shop.

Adjoining this saw is a Williams & White rail bender, which has also been so fitted up that it can be employed as a rail punch. Its use in the latter service is shown in the engraving. The company figures that its cost for recutting and punching both ends of a rail averages \$1.05 per gross ton.

Other equipment used extensively by the track department consists of an Indianapolis electric welder, an Atlas rail grinder, and an oxweld acetylene cutting equipment.

The Readers' Forum

Purchasing, Not Manufacturing, Needs Attention

CLAREMONT STREET RAILWAY

CLAREMONT, N. H., Dec. 26, 1923.

To the Editors:

In a recent issue (Nov. 17) you published an editorial entitled "An Opportunity to Expedite Standardization of Car Parts."

It is not the manufacturing end, but the purchasing end, that needs the adjustment. The opportunity is at hand for all properties, either large or small, to standardize car parts by simply using a little common sense—car shop dope—when buying new parts.

The writer has known of properties to have three different kinds of equipment under one type of car, thereby having to carry just three times as many supply parts as would be necessary were all cars equipped with the same equipment. When buying supply parts, such as bell cords, hangers, window latches, strap hangers, register mechanism fittings, grab handles, castings, journal boxes, turnbuckles, and all other repair parts, a careful survey of the results obtained from each type of part should be made and one type chosen as the standard for the system. When buying new cars, the parts which are chosen as standard should be put in the specifications and used as far as possible.

Another great fault that should be rectified is the buying of repair parts from several different sources. The writer has found during nineteen years of car-house superintending that many times repair parts bought from one manufacturer are not the same as those turned out, of a like kind, from another manufacturer, or even from the maker of the original parts,

thereby causing loss of time in the shop by having to machine the new parts to correspond to the original.

It should be the rule of the purchasing department of all systems to secure supply parts from the original maker of the equipment used.

W. G. HARRIS,
Master Mechanic.

Lightning Arrester and Choke Coil Experience

THE INDIANA, COLUMBUS & EASTERN
TRACTION COMPANY

SPRINGFIELD, OHIO, Dec. 28, 1923.

To the Editors:

I have been reading with much interest the excellent article on lightning arresters by R. T. Wagner in the *ELECTRIC RAILWAY JOURNAL* for Nov. 24, page 911.

On many of the points made, I agree with the author, and especially do I concur in his statement that the d.c. aluminum arrester is the only solution where severe conditions are met. Many years of more or less unsatisfactory experience with the various types of arresters that preceded the aluminum arrester have convinced me of the truth of his statement. I would even go further and say that I would under no condition consider the purchase of any other than the electrolytic arrester for 600-volt d.c. circuits for electric railway work.

The author mentions several types of gap arresters as being satisfactory under some conditions. It is true that a considerable degree of protection can be obtained with a gap-type arrester if used in connection with a choke coil of adequate dimensions, and with a minimum length of gap. In the writer's experience, it was found possible to reduce the gap to 0.010 in. if given frequent cleaning and inspection, but as the author points out, the jumping of even this small gap by a lightning discharge sets up severe strains in the insulation and has been the cause of numerous cases of grounds.

There is one point, however, on which I must take issue with the author. I refer to the dimensions he gives for choke coil, namely, ten or twelve turns of conductor wound on a 6-in. core. A choke coil of these dimensions is, in my estimation, entirely inadequate for this purpose.

The function of a choke coil in connection with a lightning arrester is to supply an impedance in the circuit so that when a surge of high frequency and steep wave front (as in a lightning discharge) approaches the apparatus to be protected, the impedance will reflect it back to some extent. At this point let me quote a prominent arrester engineer:

Even though an arrester is floating on the line, choke coils give increased protection in that they reflect a part of the surge back on the line where it is dissipated as heat, and that part which passes through the coil is reduced in voltage and steepness of wave front. It assists the arrester to function because it provides a higher voltage to ground just ahead of the choke coil and increases the discharge of the arrester.

Granting the above to be true, it is evident that the greater the impedance of the choke coil, the more effective it will be in assisting the arrester to function.

As in every other kind of design there are limiting conditions, and considerations other than simply to obtain the maximum impedance must be considered. We are limited as to the space that may be occupied by a choke coil on an electric car; also the fact that a cable of sufficient capacity to carry the maximum cur-

rent used by the car tends to make the weight and cost of a very large choke coil prohibitive.

There are a few simple rules laid down by engineers who have made choke coils a special study that should be kept constantly in mind in deciding on the size and shape of these coils in order that no single feature be given too much consideration at the expense of the others; which statement only tends to prove that "every design is a compromise."

1. Choke coils for use with lightning arresters should have only one layer of cable. If made with two or more layers the distributed electrostatic capacity as between the different layers will be sufficient at the very high frequency of a lightning discharge to neutralize the reactance and make the coil of no effect.

2. To get the maximum effect from a given length of cable, the length of coil should equal its diameter.

3. The value of the self-inductance of a coil varies as follows: (a) As the square of the number of turns; (b) as the square of the diameter of coil; (c) inversely as the length of coil.

As a complete example, the dimensions that I would use for a choke coil for a 45-ton interurban car equipped with four 100-hp. motors are as follows: Twenty turns of No. 0000 B. & S. stranded cable, wound on a 10-in. wooden core and supported by metal brackets at the ends.

This would make a coil about 16½ in. long and 11½ in. outside diameter. This coil, in my estimation, is of sufficient size to give adequate protection, and at the same time is not so bulky as to be objectionable. A coil of this kind can be mounted on the roof of car, or in baggage compartment, and be connected in ahead of the lights, compressor, etc., and thus give protection to all the car auxiliaries as well as to the controller and motors.

F. J. FOOTE,

Superintendent Motive Power and Equipment.

Further Light on Air Tank Testing

NEW YORK, Jan. 11, 1924.

To the Editors:

With reference to your editorial on the subject "Making Air Tanks Safe at Reasonable Cost" in the Dec. 15 issue, I am of the opinion that the method of testing tanks mentioned therein is open to serious danger. If tanks are tested by setting up the safety valve and applying air pressure there is a chance for an explosion, which may be disastrous. Even when tanks are tested by hydraulic pressure one of the requirements to assure safety is to be certain that the top of the tank is vented while being filled with water, so as to prevent entrapping any air which would remain in the tank while pressure is applied.

It is also my opinion that the use of welded seams in air tanks is open to objection. The difficulty with this construction, particularly when the longitudinal seam is welded, is the uncertain element of care in the workmanship. Although tests of welded seams have shown them to be amply strong, the danger in welding comparatively thin material lies not so much in the seam itself as in the metal of the sheet adjacent to the weld.

The personal factor in this process causes the greatest concern when an attempt is made to apply a definite efficiency factor to a seam of this kind. The boiler code committee of the A.S.M.E. has not been

inclined to look with favor on tanks of this construction. It would not be a particular hardship on the railways if tanks with welded seams were eliminated from consideration by electric railways. With forge welded, brazed and seamless construction available, there is ample source of supply without using the autogenous weld.

"ENGINEER."

How Plan to Publish Railway Bus Matter in "Journal" Is Viewed

IN THE first issue of the new year the ELECTRIC RAILWAY JOURNAL announced editorially that it would in the future publish in its own columns matter pertaining to the operation of buses by electric railways, departing from the previous policy of depending entirely on *Bus Transportation* for this service to the railway field. Following are letters from a few leading railway executives who were asked to express their view on this change in policy:

CHICAGO RAPID TRANSIT COMPANY

CHICAGO, ILL., Jan. 15, 1924.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL published on Jan. 5, 1924, I note from the editorial on page 3 that the JOURNAL will hereafter record the extent and kind of bus service undertaken by the railways. I also note from page 5 of the same issue a summary of the bus methods of 121 electric railway companies, this latter being the first comprehensive article dealing with the matter of bus operation by electric railways. I believe that your policy as announced by the editorial referred to is correct. I think that you should make electric railway bus operation a feature of the JOURNAL from now on.

Apparently, the number of companies co-ordinating bus transportation as an auxiliary to their railway systems is increasing fast and it is quite proper that the industry should be informed in your columns of the progress made.

BRITTON I. BUDD,

President.

STEVENS & WOOD, INC.

NEW YORK, Jan. 16, 1924.

To the Editors:

It was with much pleasure that I read the article in the Jan. 5 issue of the ELECTRIC RAILWAY JOURNAL, noting the broadening of the scope of the JOURNAL's activities in the bus field.

Motor bus operation has become such an integral part of city and urban transportation problems and such a vital necessity in most communities as a supplement to electric railway service that up-to-date, reliable information on this subject is just as necessary to the electric railway man as information on any of the other subjects covered by the JOURNAL in the past.

Electric railway men are accustomed to look to the JOURNAL for the latest news in regard to the progress in this field, which has been so thoroughly and reliably covered by this one magazine until the advent of the bus, since which time, however, it has been necessary for street railway operators to supplement the JOURNAL's service by one or more of the bus magazines, at considerable inconvenience.

The JOURNAL having, as I understand it, adopted the

policy of covering the bus field, as far as it affects electric railway operations, has filled a long-felt want. I extend my congratulations on your progressiveness.

R. P. STEVENS.

THE UNITED RAILWAYS & ELECTRIC COMPANY
OF BALTIMORE

BALTIMORE, MD., Jan. 15, 1924.

To the Editors:

I note with pleasure your editorial of Jan. 5, to the effect that the JOURNAL hereafter will give attention to the railway operation of buses.

It has been interesting to note the gradual realization of the fact among street railway operators that street railways, of necessity having practically a monopoly of the transportation business in their communities, must make use of all forms of transportation now, including buses, trackless trolleys and, perhaps, in the future, airplanes.

I am sure the JOURNAL will be more interesting because of including in its issues reference to all forms of transportation that necessarily must, in future, make up the systems of transportation in the various cities.

C. D. EMMONS,
President.

NEWPORT NEWS & HAMPTON RAILWAY, GAS &
ELECTRIC COMPANY

HAMPTON, VA., Jan. 15, 1924.

To the Editors:

I have read with interest the article "Extent and Kind of Bus Operation by Electric Railways," published in your issue of Jan. 5, as well as your editorial on the same subject in the same issue.

I have long thought the electric railway operator might profitably study the operation of buses. Not only should he study it as a competitor, but much more closely with the idea of using it to supplement and extend his own service to the people.

The people demand the most modern in transportation as in everything else, and if local transportation is to be treated as a monopoly, then the company supplying the service must be prepared to give the people what they want.

The departure outlined in your editorial indicates that you are ready to aid the wide-awake traction man in keeping abreast of the times. You are to be commended for your energy and progressiveness.

J. N. SHANAHAN,
President.

SCHENECTADY RAILWAY COMPANY

SCHENECTADY, N. Y., Jan. 15, 1924.

To the Editors:

I have read the editorial in your issue of Jan. 5, 1924, on the subject "Railway Operation of Buses to Be Treated in the JOURNAL," and in so far as you may be interested in my doing so, I can express approval of your announced policy. Whether the bus is approached as a "useful ally or as a troublesome competitor," the electric railway man wants to know what use other railway men are making of the bus and with what results, and it seems to me to be a proper and useful function of the JOURNAL to give him that information under the same cover.

E. M. WALKER,
President.

THE CONNECTICUT COMPANY

NEW HAVEN, Jan. 15, 1924.

To the Editors:

I have your telegram of the 14th asking me to comment upon your plan for publishing current news relative to the operation of motor vehicle common carriers by electric railroads.

There is no question but that such vehicles are rapidly becoming an adjunct to practically all electric railway service throughout the country, and so many of the electric railways are now using them that it would certainly be desirable to have the greatest possible degree of publicity given to the subject in order that all managements may be thoroughly informed as to the development of this new method of transportation.

L. S. STORRS,
President.

BOSTON ELEVATED RAILWAY

BOSTON, MASS., Jan. 15, 1924.

To the Editors:

In reply to your request, beg to advise that personally I am entirely in accord with the expressed view of the JOURNAL of publishing bus articles in the JOURNAL, and it will make it just so much more indispensable to me. It would seem that it was following out the policy of co-ordination which is the basis upon which bus operation has always appealed to me.

EDWARD DANA,
General Manager.

INDIANA SERVICE CORPORATION

FORT WAYNE, IND., Jan. 15, 1924.

To the Editors:

In reply to your inquiry, I wish to advise that, in my opinion, it is proper that all information pertaining to buses be included in the ELECTRIC RAILWAY JOURNAL, for the reason that this is a transportation matter, and if such service is desired or necessary, it should be handled by the present, established transportation organizations.

S. W. GREENLAND,
General Manager.

NEW ORLEANS PUBLIC SERVICE, INC.

NEW ORLEANS, LA., Jan. 15, 1924.

To the Editors:

I have noted with interest the modification of the editorial policy in handling motor bus news, announced in the ELECTRIC RAILWAY JOURNAL of Jan. 5, and it seems to me now to reflect correctly the needs of both the electric railway and motor bus industries.

H. B. FLOWERS,
President.

THE CAPITAL TRACTION COMPANY

WASHINGTON, D. C., Jan. 15, 1924.

To the Editors:

I have read the editorial in your issue of Jan. 5 and also the article dealing with the use of buses by electric railways. I believe that the policy as outlined in this editorial of publishing in the JOURNAL news and other articles concerning the operation of buses by electric railways will be of much benefit.

J. H. HANNA,
Vice-President.

Equipment Maintenance Notes

Wood Block Selected for Paving Along Rails

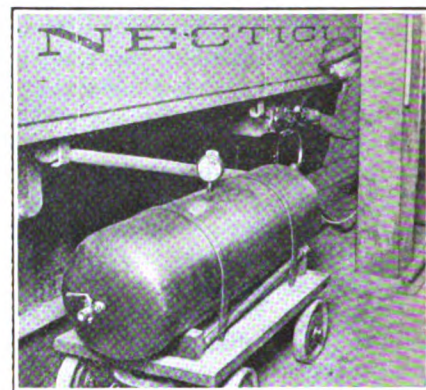
ON THE Harrisburg Railways, Harrisburg, Pa., particular attention has been paid to the type of paving used alongside the rails. This has been somewhat of a problem because of the residential character of the city, which is the capital of the state, and the consequent desire for smooth and quiet pavement. Asphalt is generally used for the vehicular roadways, and the company has even tried it along the tracks. This has not proved satisfactory, however, because water has seeped in between the rails and the asphalt and damaged the pavement.

Brick liners have been tried, but it is thought that the contrast when placed next to the asphalt gives an undesirable appearance. Moreover, bricks are frequently broken when the asphalt is first being rolled. It

alongside the rails. These are laid parallel to the rail, three deep on the outside to fill out to the line where the railway's responsibility ends and two on the inside. They present a good appearance and wear well as long as the track foundation is solid. They are, however, rather easily displaced by movement of the rail.

Testing Compressors on Cars

THE Connecticut Company, New Haven, Conn., overhauls its rolling stock on a 100,000-mile basis. The overhauling of car equipment also includes the compressors, which are tested on the cars before and after the overhauling. For convenience in testing, a tank of exactly 5 cu.ft. capacity has been mounted on a truck. This is provided with a gage and a valve for bleeding off the air pressure. Compressors are tested



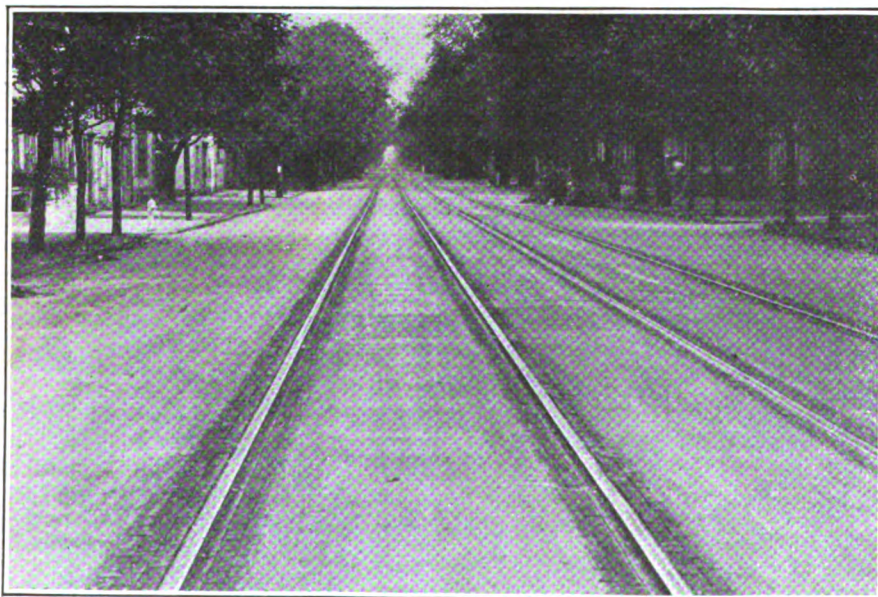
Counting the Revolutions of a Compressor Armature on Test

revolutions required to pump from 60 lb. to 90 lb. is counted. A table has been prepared from the manufacturer's rating of the compressor, so as to show what the number of revolutions should be under proper conditions. A glance will then show whether there are abnormal conditions that require attention. After overhauling, compressors must conform to the requirements within certain definite limitations in order to be passed for service.

This outfit is convenient not only for testing compressors and overhauling, but it is also of assistance in testing when cars are reported for air or compressor trouble.

New Type Crossing Foundation in El Paso

IN INSTALLING five crossings over steam roads last winter, the El Paso Electric Railway adopted what was believed to be an entirely new type of foundation as applied in street railway practice. Four creosoted piles were driven under each crossing, care being taken to locate a pile directly under each gage intersection. These piles were capped with heavy creosoted timbers lengthwise on the steam track. About 30 in. of stone ballast was well tamped and rammed in around the tops of the piles and caps. The crossings were planked with pine boards, cut to fit between the manganese castings, and then covered with a thin layer of asphalt. The manganese crossings and the paving so far are in practically perfect condition.



Wood Block Liners Look Well and Wear Well So Long as the Rail Is Solid

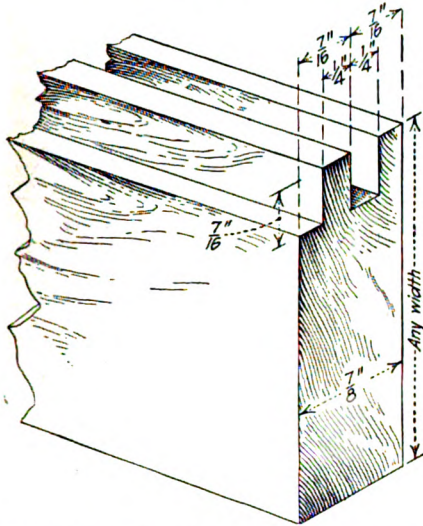
is likely that granite blocks would have many desirable characteristics for this use, but because the rest of the street is paved with a smooth surface there has been considerable objection to their use in the track area. Various patent paving guards have been tried, but all have proved to be unsatisfactory, and consequently wood blocks have been selected by the company as the best pavement

for the time necessary to pump up to a given pressure and also for the number of revolutions.

After connecting the tank to the compressor, the test consists of pumping up the pressure in the standard tank to 90 lb. This is then reduced to 40 lb. and again pumped up. When the pressure reaches 60 lb., a revolution counter is applied to the armature shaft and the number of

Double Tenon Increases Strength of Glued Joints

IN MAKING up car flooring, or in other details of car construction where it is necessary to employ a glue joint to increase the effective width of the board, a double tenon



Double Tenon Joint Cut on Circular Saw Is Used in Joining Flooring

joint employed by the Metropolitan West Side Elevated Railway, Chicago, in its shops has been found to increase the strength.

In the case of $\frac{3}{4}$ -in. flooring which this company uses, a circular saw with no set is used to cut the two mortises or grooves in the edge of the board. The first cut made by the saw produces the open mortise, while the second mortise is made by moving the saw over a distance equal to twice the width of the saw cut. The only precaution necessary in cutting the board is to make sure that one side of the second mortise is directly in the center of the board edge.

So accurate is this method that the practice employed at the Elevated shops has been to run off a long board with the two mortises and then cut the board into suitable lengths and match them up. This method can be used not only on flooring but on other details of car construction where glued joints are required.

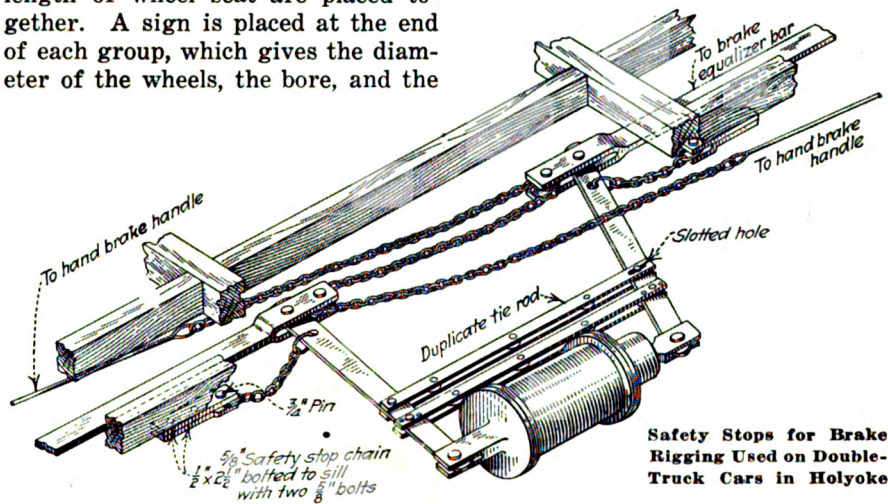
Carefully Arranged Wheel Storage Saves Time

THE accompanying illustration shows a portion of the wheel storage of the New York & Harlem Railroad, New York City. Particular attention has been given to the grouping of wheels, so that those having the same bore and the same length of wheel seat are placed together. A sign is placed at the end of each group, which gives the diameter of the wheels, the bore, and the

all this work is done at the time the wheels are placed in the storage. Not only does this arrangement save time when wheels are to be mounted, but the orderly arrangement also saves much space and gives the impression of a well-regulated shop.

Safety Stops for Brake Mechanism

ALL of the double-truck cars on the Holyoke Street Railway, approximately 100 in number, are equipped with a special safety stop for the brake rigging, originated by the engineers of that company. This mechanism is clearly shown in the accompanying illustration and prevents the brake rigging on one end of a car from becoming inoperative



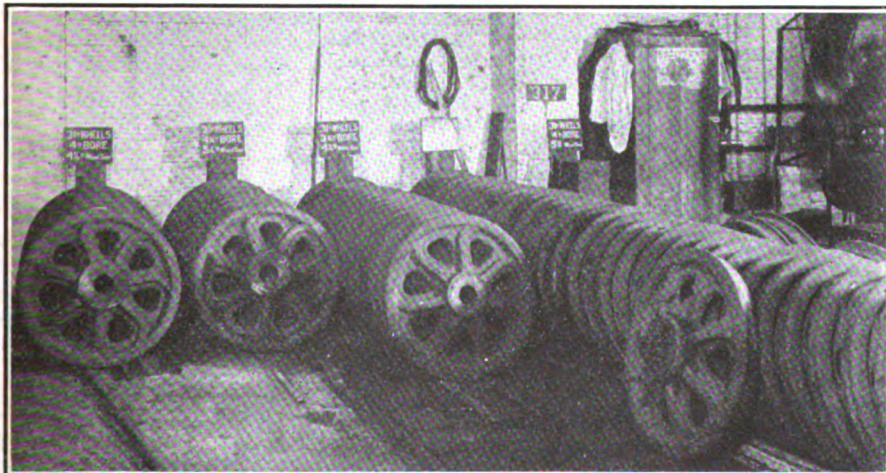
length of the wheel seat for all wheels in that particular row.

With this arrangement all that is necessary in choosing a wheel for a particular axle is to know the essential dimensions of the size wheel desired. No testing or measuring of the individual wheels is necessary, as

through the breakage of a pin in the mechanism on the opposite end.

As will be seen, there are two provisions to hold the lever operated by the air cylinder in case of breakage of connecting pins. One of these is to protect against the breakage of the pin connecting this lever with the rod operating the brake equalizer bar on each truck. This protection consists of a short chain of which one end is attached to the lever and the other is bolted to a sill of the car which is stationary. Thus the end of the lever is held by, although not connected to, the equalizer bar.

The other safety device is to protect against the breakage of the pins which connect the tie rod with the two levers operated by the air cylinder. This protection, as shown, consists of a duplicate tie rod close to the other and with a slotted hole at one end in which the brake lever pin can move so that the tie rod does not interfere with the movements of the lever.



Wheel Storage at New York & Harlem Railroad Shop



Moist Concrete Has Been Found More Satisfactory than a Very Dry Mixture



Wood Ties Placed 12 Ft. Apart Are Now Used Instead of the Short Blocks Shown Here

Track Construction Methods Using Wet Concrete

CONCRETE track foundations and International steel ties have been used extensively by the Harrisburg Railways, Harrisburg, Pa., in paved streets.

A considerable degree of moisture in the concrete is favored by the railway. Experience in Harrisburg has developed the fact that if an extremely dry concrete is used it is very difficult to get it worked thoroughly into place. Whatever additional strength might be gained by the dry mixture is lost by not having it properly placed.

An innovation which was recently tried is the use of additional wood ties spaced 12 to 15 ft. apart on rock ballast. With steel tie construction when a wet concrete mixture is used concrete has set because the steel ties resting on wet concrete have insufficient bearing. In a recent track rebuilding job, however, this company tried the use of old ties to support the rails during construction. This gave the track greater rigidity while the concrete is in process of setting and prevented displacement in a horizontal direction such as sometimes occurs if the track is not held firmly in place.

Concrete Mixer Operates on Rails or Pavement

BECAUSE the street outside the tracks of the Market Street Railway, San Francisco, is occupied by the Municipal Railway, it was necessary during the recent reconstruction of the track of the former company to run the concrete mixer on the rails. To provide the wheels with flanges to fit the rails, bulb angles were used, the flange of the

angle being cut off. The remaining flat bar with the bulb was then bent around the old wheel and bolted into place, the bulb forming a very satisfactory flange $\frac{5}{8}$ in. deep. With these wheels the mixer can be operated either on the rails or on the pavement, and can be run on and off the track easily.

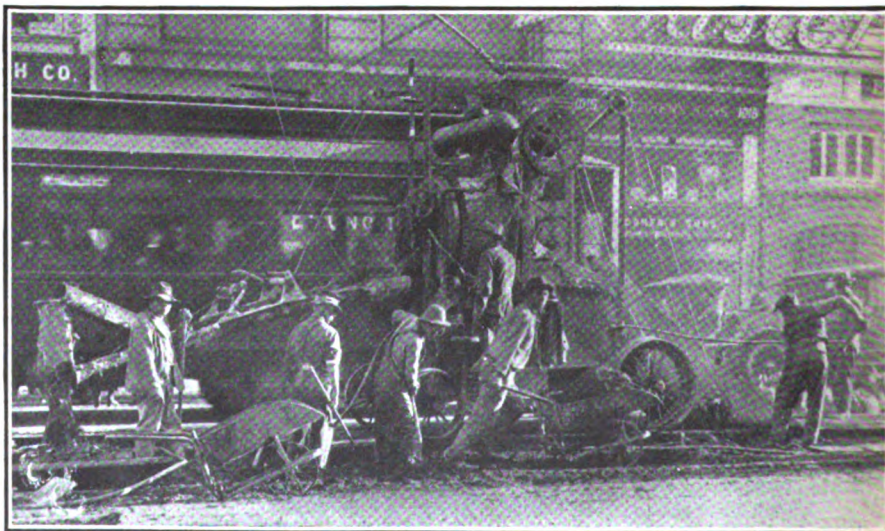
The mixer, which is self-propelled by an electric motor, has been provided with a standard trolley pole and base, so that current can be obtained direct from the trolley wire. During the track reconstruction work on Market Street it was necessary each day at about 3:10 p.m. to remove the mixer from the track in order that cars could operate over it between 3:30 and 7 p.m. This was accomplished by moving the machine along the track by its own power to some convenient location, where the paving was undisturbed, and then running it off the rails onto the street. There it was parked alongside the curb, it being handled while off the rails by "fish

lines" to the trolley wire and ground.

For the Market Street job the rock, sand and cement were distributed between the tracks ahead of the mixer in 70-ft. spaces or zones, the correct quantity of material being placed in each zone. Continuous operation of the mixer without stops on account of improper distribution of material was thereby accomplished. The concrete was placed for 5,500 ft. of single track with this outfit in nineteen days, using 4,700 sacks of cement.

Six portable loading platforms, each 10 ft. 6 in. long, were used in the track instead of the mixer, the platforms being supported by tie rods. These were moved ahead one at a time as the mixer advanced. Wheelbarrows were loaded on these platforms and the material carried to the mixer.

On other jobs the mixer is operated on the street alongside of the track, the material being placed on the side of the track ahead of the

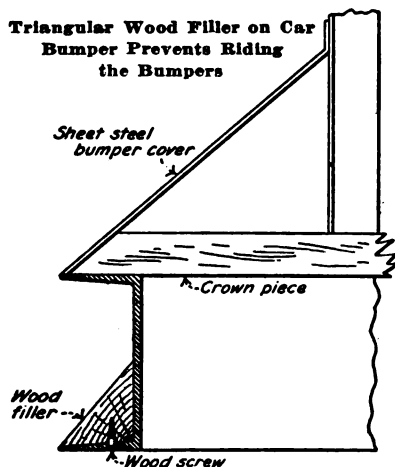


The Presence of Four Parallel Tracks on Market Street, San Francisco, Made It Necessary to Equip This Concrete Mixer for Operation Either on the Rails or on the Pavement

mixer. A special wire reel on the mixer has two electric cables each 250 ft. long, one for the trolley and one for the ground connection. As the mixer advances, the reel unwinds, laying the cable on the pavement behind the machine. When an advance of 250 ft. has been made, the trolley pole stand is moved ahead and the cable rewound on the reel. The trolley pole is especially made and is set on a portable base outside the track. A 6-ft. horizontal hinged arm is provided at the upper end. The outer end has a copper pan, which fits up against the underside of the trolley wire and is held in that position by a rope and weight attached to the pole end of the arm. The pan is so shaped that trolley wheels pass under it without interference.

Wood Filler Keeps Passengers Off Bumper

WHEN the flanges of the car bumper channel are turned toward the outside, a number of structural advantages are obtained. In addition the bumper acts as an

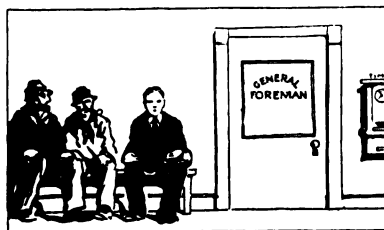


anti-climber in the event of a collision. This arrangement, however, creates an accident hazard because passengers sometimes stand on the lower channel flange, which is not protected by the bumper cover.

The simple construction used by the Chicago Surface Lines, and shown in the accompanying sketch, overcomes this difficulty. A triangular shaped filler of ash or oak, cut in segments of the proper radius to fit tight against the outside of the channel, is held in place with flat-head screws put in through the lower flange of the channel. When these fillers and the bumper are thoroughly painted, a neat and workmanlike job is obtained which effectually prevents "hitching on" at the rear end of the car.

Dick Prescott Gets a Job

And Some Early Impressions



DICK PRESCOTT entered the shop office of the Consolidated Railway & Light Company at 7 o'clock in the morning and asked to see Thomas Mullaney, the general foreman.

"What d'you want to see him for," growled the sullen-faced clerk who sat back of the window marked, "Timekeeper."

"I'm looking for work in the shop."

"All right, sit down over there."

At 12 o'clock, Dick Prescott was still sitting outside of Thomas Mullaney's office. Each time the heavy door at the end of the room with the legend "General Foreman" on it opened, he glanced up expectantly. Suddenly, the monotony and dull rumble of machinery were interrupted by the discordant shriek of a steam whistle. Almost instantly the outer office became a bedlam, as overall-clad men rushed noisily in past the row of time clocks to punch their time, and on out to the street. Dick caught snatches of conversation as the men jostled each other in their hurry to get to their dinner pails.

"Gee, the old man's sure on the warpath this morning."

"Yeah, guess he's sore them guys over in the carpenter shop quit this morning."

"I know what's the matter all right, all right. Heard Steve White, the carpenter foreman, talking to Harry Carter near my lathe this morning. Guess the old man got jumped on good and proper last week by the big boss downtown, because it costs more to repair cars in this shop than over in Marmon City where they pay more money to their men."

"Gosh! He sure did have all them foremen jumpin' around this morning. Says they've all got to keep on our necks and get out more work. Guess the new big boss downtown knows—"

Here the lively discussion was lost to Dick as the men passed through the door. At 12:30 the

whistle shrieked again and the dull rumble, which had ceased with the earlier blast, again resumed.

Shortly after 1 o'clock the inner office door opened and a large, stocky man, wearing a dusty slouch hat and clenching the unlighted remains of a cigar between his teeth, emerged. Glaring at Dick, who quickly arose, he blurted out,

"Well, what can I do for you?"

"I'm looking for work, sir."

"What's your trade?"

"I haven't any particular trade, sir. I was studying to be a mechanical engineer, but had to leave college last month because of lack of money."

"Oh you're one of them college men, eh? Well d'you think you'd make a carpenter?"

"Of course you know I wanted to be an engineer, Mr. Mullaney, but I'm glad to take anything that's open. And I assure you that I'm not afraid of hard work. I've always been pretty handy with tools."

"Engineering, eh? Say, this is a railroad shop, and what we need is hard work and hoss sense. Them engineers over in the Marmon City shop has been doing a lot of talking with a bunch of fancy records and all that, but I'll show 'em yet that I ain't been running a shop thirty years for nothing. If you want a job I'll put you on as carpenter's helper at 42 cents an hour."

"All right, sir, I'll be glad to do the best I can."

"Hey Steve," called the general foreman to the timekeeper back of the little window, "put this man on as a carpenter's helper, and start his time tomorrow morning."

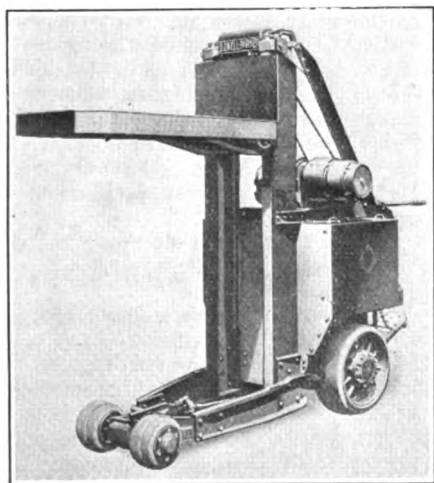
"Thank you, Mr. Mullaney," said Dick as he started toward the window.

Tom Mullaney turned on his heel and approached two other men waiting for work. He could not foresee the far-reaching results of that hurried order to the timekeeper. (To be continued next month)

New Equipment Available

Heavy-Duty Elevator Truck for Shop Use

A NEW development in truck and tractor construction has been placed on the market by the Elwell-Parker Electric Company, Cleveland, Ohio. This is a truck with an adjusted platform that will pick up, transfer and set down a loaded skid, and will take a load at any height up to 6 ft., deliver and deposit it at any



The Platform of This Electric Truck Tractor Has a Lift of 6 Ft.

height between this and the floor level. It has been designed to handle 6,000-lb. loads easily and safely. The tractor is 9 ft. 4 in. long, 7 ft. 11 in. high and may be driven through a 3-ft., 6-in. doorway.

The load deck is a cantilever, built of heavy formed plates on two long steel arms of large section. At the supported end each arm carries two large ball-bearing rollers. The lower or forward rollers just beneath the platform are provided with deep flanges and travel on the face of heavy vertical channels, while the upper rollers are straight faced and bear on the rear of the channels.

The two platform arms also carry the moving portion of the hoist mechanism, counterbalancing a portion of the platform weight. The vertical movement of the platform is accomplished by a rack and pinion driven by an electric motor through a pair of cables. A safety or trip switch automatically limits the travel, and opens in case the outer end of the platform catches on an obstruction when descending. The

loaded platform drives the hoist motor as a generator when descending and returns some of the energy which is drawn from the battery when rising.

The front axle consists of a heavy steel casting bored and fitted with a heavy steel shaft, which carries on knuckle pins two cupped wheels with long tapered roller bearings in a dustproof case. Each front wheel has dual 10-in. x 3-in. solid rubber tires, which are not pressed on but are fitted to the wheel and will differentiate when steered. The major portion of the load is carried on this axle. The wide spread of the tire contact surface distributes the load, but permits steering where a wide single tire could not.

The battery compartment will accommodate a thirty-cell Edison or a sixteen-cell lead battery. The truck with battery weighs 5,200 lb., travels at 300 to 400 ft. per minute and hoists at a speed of 5 to 6 ft. per minute.

New Tape for Maintenance and Electrical Repairs

A NEW varnished cambric tape which is bias cut and seamless is being placed on the market by the Mica Insulator Company, Chicago, Ill. In addition to having the advantages of the regular lines of impregnated bias tape, special consideration has been given to the production of uniform thickness and the elimination of seams. The elimination of the seams prevents lost time in cutting out these seams and also the waste in labor and material from the cutting; also there is less danger of short circuits occurring due to failure at seams. This tape is being furnished in both yellow and black of a thickness of 0.007 and 0.010 in. with widths of $\frac{3}{4}$ in. and 1 in.

Interchangeable Resistor Assists Standardization

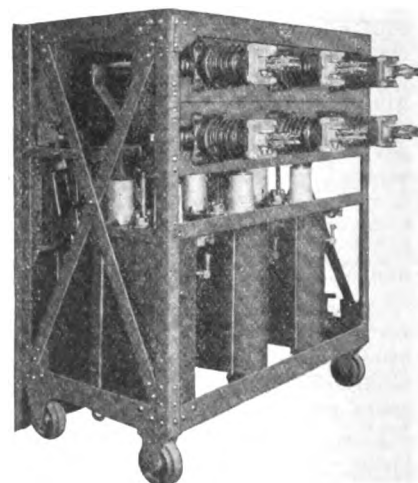
TO ASSIST in the standardization of resistor grids, the General Electric Company has developed a type BG railway resistor which is interchangeable, both electrically and mechanically, with resistors made by other manufac-

turers. It consists of a sheet steel punched end frame with sufficient holes to enable its support on the same bolt-hole centers as other generally used resistors. The convolutions of this type resistor are shorter than the General Electric CG and RG types, the grids are stronger and less likely to break or warp and the number of contacts is reduced to half. The resistor is arranged for mounting with standard porcelain supporting bolt insulators.

Truck-Mounted Oil Circuit Breaker

FOR application in electric railway substations where minimum space requirements are important and where large interrupting capacity is required, oil circuit breakers mounted on trucks have been developed by the Westinghouse Electric & Manufacturing Company. The truck-mounted models include all indoor-type breakers.

The truck-mounted breaker takes up less space than other types and the installation cost is low, since the breaker, with disconnecting switch contacts, is shipped as a unit. An interlocking device prevents accidents resulting from the circuit-breaker



Truck-Mounted Oil Circuit Breaker

truck being removed from its compartment or inserted when the breaker is in the closed position. The breaker cannot be closed until the truck is completely inserted in its compartment.

When repairs are necessary a complete unit can be removed to the repair department, where adjustments or repairs can be made under the best conditions. A spare unit can then be used in place of the one taken from its compartment.

Association News & Discussions

Washington Transportation Conference

AT THE transportation conference called by the United States Chamber of Commerce, and held in Washington Jan. 9, 10 and 11, the six reports recently made to the chamber by its transportation committees were discussed. The first day was devoted to the reports on governmental relations to railroad transportation, railroad consolidation and freight rate schedules. On the second day the topics considered were the relation of highways and motor transport to other transportation agencies, taxation of transportation agencies and the development of waterways and their co-ordination with the railways. On Friday resolutions embodying the conclusions reached during the discussions were presented. Of the topics considered, the electric railway phases of the report of the committee on motor transport or the taxation of electric railways and buses did not come up in the discussion.

In general, the conference indorsed the present national transportation policy, as represented by the transportation act of 1920; adjustment of inequalities in the freight rates, improvement of terminal freight facilities by organized motor transport, with the greater use of motor bus and truck lines for mail lines where they can advantageously supplement railroad service, and the regulation of motor common carriers by the existing authorities. The declaration in regard to the taxation of transportation agencies follows, in full:

TAXATION OF TRANSPORTATION AGENCIES

1. Each form of transportation should bear its fair share of the burden of public expenditure.
2. Taxation of common-carrier transportation agencies should be simplified as far as possible.
3. Taxes on regulated common carriers operated for hire should bear a definite relation to gross and net earnings rather than to invested capital.
4. This requirement can best be met in the case of steam and electric rail common carriers by the imposition of a tax on gross earnings, together with a graduated tax on net earnings, in lieu of the present systems of taxation. Pending full regulation of the motor common carrier, such increases should be made in taxes now levied against it as will bring them to an amount equitably proportionate to that which may be assessed against the other carriers.
5. The entire cost of maintaining the improved highways of the country should be borne from special taxes levied against the road user. Such taxes should be used for no other purpose.
6. Co-ordination of highway construction and maintenance under centralized administrative agencies is urged to eliminate waste and secure efficiency.

The first of the regional meetings of the United States Chamber of Commerce, at which the six reports mentioned and the conclusions reached at

the Washington conference were considered, was held by the Eastern district of the national chamber in Philadelphia this week.

Elihu Thomson to Receive Kelvin Medal

DR. ELIHU THOMSON, consulting engineer General Electric Company, and one of the pioneers in the development of electric traction in America, will be awarded the Kelvin medal for 1923. It will be conferred upon him in London during the coming summer, when Dr. Thomson will be accompanied on a trip abroad by representatives of American engineering societies. This medal is awarded triennially "as a mark of distinction to a person who has reached high eminence as an engineer or investigator in the kind of work applicable to the advancement of engineering with which Lord Kelvin was especially identified." The award committee consists of the presidents of the various British engineering societies. The medal was first awarded in 1920, the recipient being the late Prof. W. C. Unwin of England. At the October, 1923, meeting of the board of directors of the American Institute of Electrical Engineers, the secretary of the award committee of the Kelvin medal invited the institute to suggest a candidate for the medal, a similar invitation having been received by the other founder societies. The joint recommendation proposed the name of Dr. Thomson, who will be the first person in America to be awarded the medal.

Kentucky Utilities Association

POPULARIZING utility service and the utilities' responsibility to the public were major subjects before the seventh annual meeting of the Kentucky Association of Public Utilities in Louisville, Jan. 10. On the previous evening a dinner was given to the delegates by the public utilities of Louisville.

In his presidential address W. H. Harton, general manager Cincinnati, Newport & Covington Railway, pointed out that the public has just begun to realize that it is necessary, in order to get service, that the utility have money; in order to secure this it must go into the competitive market and show good credit, which requires good return and consequently fair rates.

Frank B. Jordan, secretary of the Indianapolis Water Company and vice-president of the American Water Works Association, urged all utilities to popularize their service in much the same

way that commercial products are now being advertised. He also urged playing up the fact that utility service is the cheapest service available; that it costs only 15 cents per day per capita for all utility service including electric light and power, railways, gas, water, telephones.

The benefits of conventions to men in the ranks was very effectively and concisely stated by G. B. Powell, assistant general superintendent Louisville Railway. Executives should be at conventions, he declared, but why should they not carry back the information which they obtain there to men on the job? The men in the ranks need this information, because the majority of them do not have time to study transactions of national organizations.

Oklahoma Association Meeting

ANNOUNCEMENT is made that the sixth annual convention of the Oklahoma Utilities Association will be held at Oklahoma City March 11, 12 and 13.

A.E.C. Elects Officers

JAMES HARTNESS, former Governor of Vermont, and past-president of the American Society of Mechanical Engineers, was elected president of the American Engineering Council to succeed Dean Mortimer E. Cooley of the University of Michigan, at the annual meeting of the council, held in Washington on Jan. 10 and 11. Vice-presidents elected were L. P. Alford of New York and Charles R. Gow of Boston. Other vice-presidents are Calvert Townley of New York and Gardner S. Williams of Ann Arbor, Mich. Dr. H. E. Howe of Washington was re-elected treasurer, and L. W. Wallace of Washington was again chosen executive secretary.

An outstanding feature of the Washington assembly was the national public works conference held on Jan. 9, and attended by representatives of sixty-three engineering and allied organizations. The conference adopted resolutions favoring a reorganization of federal departments.

Another event was the annual dinner on Jan. 10 at the Chevy Chase Club. Secretary Hoover, President Nicholas Murray Butler of Columbia University, Assistant Secretary Dwight F. Davis of the War Department, President Hartness of the council, and the Italian Ambassador, Don Gelasio Benedetto Anatolio Caetani, addressed the guests. Both Secretary Hoover and Dr. Butler emphasized the need of broader engineering education and of

greater engineering participation in the social, economic and political life of the country. The Ambassador outlined a plan by which young graduates of Italian technical schools will be brought to America and provided employment in the industries.

In his farewell address to the council, Dean Cooley said that progress of industry and social well-being were so intimately bound up with engineering that this profession could no longer be held back. He added: "The American engineer should recognize that the growth of our civilization has imposed upon him other duties than those to which he has been long accustomed. The world needs his training applied in new fields. Engineers in the past have been curiously silent regarding public affairs. Whatever the explanation of this silence, the time has come to say something and say it out loud."

Wood Preservers Adopt Specifications

THE American Wood Preservers' Association met at Kansas City, Mo., on Jan. 16. The work of this association towards conservation of timber was continued by the adoption of standard specifications for the pressure treatment of timber posts, ties, piling and poles. It is expected that these specifications will later be presented before the American Engineering Standards Committee for adoption as American standards.

Program New York Association

THE program of the New York Electric Railway Association meeting at the Commodore Hotel, New York, Jan. 24, is as follows:

"Motorbuses the Keynote of Expansion for Street Railways," by W. P. Kennedy, president Kennedy Engineering Corporation, New York City. Discussion to be led by E. H. Lamberger, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

"Production of Rattan and Its Uses," by Bertram Berry, Haywood-Wakefield Company, New York City.

Report of Proceedings of Accountants' Committee, by E. H. Reed, auditor Brooklyn City Railroad.

"Effect of Unregulated Motor Truck Freight Transportation on Electric Railway Freight Transportation," by F. E. Watts, general freight agent New York State Railways, Utica, N. Y.

"Prevention of Automobile Accidents," by J. J. Sharkey, claim agent New York State Railways, Rochester.

"Value of Daily Operating Statistics and How They Are Obtained," by A. L. Hodges, assistant secretary-treasurer Brooklyn City Railroad.

At the 6:30 dinner in the evening at the Commodore, Arthur ("Bugs") Baer will address the gathering on "Just Among Ourselves." The Hon. George H. Moses, United States Senator from New Hampshire, will speak on taxes, and a representative of the United States Treasury Department will talk on Mr. Mellon's tax plan.

Program of C.E.R.A. Meeting

AT THE annual meeting of the Central Electric Railway Association, which will be held at the Hotel Lincoln, Indianapolis, Ind., Jan. 24-25, the first morning session will convene at 10 o'clock. Following the report of the secretary and treasurer and the appointment of convention committees, the following program will be given:

Annual address, by James P. Barnes, president Louisville Railway, president of the association.

"Efficiency and Common Sense," by C. B. Auel, Westinghouse Electric & Manufacturing Company.

Discussion, led by Arthur W. Brady, R. N. Graham and W. S. Rodger.

"Multiple-Unit Control for Through Operation," by Thomas Conway, Jr., University of Pennsylvania.

Discussion, led by C. N. Wilcoxon and J. F. Collins.

The afternoon session will be devoted to a meeting of the Engineering Council. Following reports of committees,

the program given will be:

"Outdoor Transformer Substations, Switching and Protective Equipment," by B. W. Kerr, president Railway & Industrial Engineering Company.

"Possibility of Utilizing the Grid Losses for Heating Purposes," by D. D. Ewing, professor electric railway engineering, Purdue University.

The future policy of the Engineering Council also will be discussed.

At 6:30 p.m. the annual dinner will be given. This will be informal. Hon. James E. Cox, former Governor of Ohio, will be the speaker of the evening. It has also been arranged to show five reels of air service pictures.

On Jan. 25 a morning session only will be held, the program being:

"Problems of National Interest to the Industry," by Charles L. Henry, president Indianapolis & Cincinnati Traction Company.

"The Future of the Industry from the Viewpoint of an Outsider," by W. L. Taylor, vice-president Fort Wayne & Northwestern Railway.

American Association News

Date and Location of Next Convention

THE following committee on date and location of the 1924 annual convention of the American Electric Railway Association was authorized at the meeting of the executive committee on Jan. 11.

Chairman, J. N. Shannahan, president Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.; C. E. Morgan, Col. A. T. Perkins, J. H. Hanna, George Keegan, Ernest Stenger, Paul E. Wilson, E. J. Blair, H. B. Flowers, Luke C. Bradley, J. C. McQuiston, L. W. Shugg, C. L. Van Auken, Harry L. Brown, B. A. Hegeman, Jr., C. R. Ellicott, W. R. Hulbert, Cornell S. Hawley, Charles Royal and W. H. Huelings, Jr.

Midyear Meeting Arrangements

THE committee on arrangements for the Midyear Meeting of the American Association at St. Louis, March 4, under the chairmanship of W. H. Sawyer, president East St. Louis & Suburban Railway, East St. Louis, Ill., has not been announced in full heretofore. The committee membership follows:

E. B. Meissner, vice-chairman; P. S. Arkwright, W. A. Baehr, James P. Barnes, C. E. Morgan, L. H. Palmer, Harry L. Brown, F. G. Buffe, F. D. Burpee, G. H. Clifford, Edward Dana, C. R. Ellicott, H. B. Flowers, L. E. Gould, F. T. Griffith, A. A. Hale, J. H. Hanna, W. V. Hill, H. J. Kenfield, M. B. Lambert, A. T. Perkins, D. W. Pontius, R. V. Prather, Harry Reid, Ernest Stenger, E. P. Waller, Birney Club of St. Louis, Electrical Board of Trade of St. Louis.

L. H. Palmer, general manager United Railway & Electric Company of Baltimore, has been appointed chairman of the sub-committee on transportation. Each member of the general committee has been requested to cooperate with him.

A special train, or at least special cars, is already being planned to run from New York City to St. Louis, probably leaving New York on the evening of Saturday, March 1, arriving at St. Louis Sunday evening. Arrangements for this are being made by C. E. Morgan, C. R. Ellicott, A. A. Hale and Harry L. Brown.

Arrangements have been made whereby the delegates attending the convention will be able to travel for fare and one-half, the round trip ticket being purchased at point of origin. The association will send the necessary certificates to delegates.

Mr. Sawyer reports that applications have already been received for between 200 and 300 hotel and dinner reservations and that there is every indication that the St. Louis location will draw a large crowd.

Rapid Transit

THE committee on rapid transit, newly organized this year, held its first meeting on Jan. 11 in New York. Those in attendance were President Britton I. Budd, Chairman W. S. Mendon, Secretary J. W. Welsh, Edward Dana, L. H. Palmer, B. J. Fallon, E. J. Blair, H. A. Johnson, J. W. Colton, G. C. Hecker, M. B. Lambert and Charles R. Ellicott.

Mr. Budd outlined briefly the purposes of the committee. He said that

in anticipation of the probable extensive development of rapid transit during the next ten years, due to the growth of cities, and the tendency of congestion to force surface cars off the street, it would be desirable to plan ahead and provide public officials and the public with an authoritative report on some of the major aspects of the subject, particularly to point out to the people what they can afford in the way of rapid transit systems, and the desirability of taking steps to increase the surface capacity of streets as a means of postponing the investment in rapid transit until it can more nearly be carried by the earnings of the system.

Mr. Menden outlined the scope of the committee's work thus: To report on the following subjects:

1. The development of existing systems and introduction of new systems.
2. The control of street traffic; parking and other restrictions; traffic regulations and signals; and modification of street layouts, such as widening or double-decking present streets or building additional streets.

The first of these subjects was assigned to a sub-committee composed as follows: B. J. Fallon, chairman; Edward Dana, R. F. Kelker, Jr., E. J. Doyle, C. S. Klumpp, James B. Walker.

The second subject was assigned to L. H. Palmer, J. H. Alexander, G. A. Richardson, F. R. Phillips, E. J. Burns and W. R. Maltbie.

Out of a discussion of ways and means to stimulate greater activity in the development of new types and better cars and equipment for electric railways, it was decided that this committee and the committee on city operation and the one on interurban operation should give consideration to the possibility of making definite suggestions as to desirable directions of research and development work. Later the vice-chairmen of these committees and representatives of the manufacturers will be called together for the purpose of discussing possible improvements.

Hearing on Recapture Clause Postponed

INFORMATION has been received from Charles L. Henry, chairman of the committee on national relations of the American Association, that his request has been granted for a postponement of the hearing before the Interstate Commerce Commission on the recapture clause of the transportation act of 1920, as applying to interurban railways. This hearing, originally set for Jan. 23, has been postponed to March 19, at 10 a.m.

The Supreme Court of the United States has decided that the recapture clause of the transportation act of 1920 is constitutional. Under Section 15a, no railroad is permitted to earn on its fair valuation in excess of a rate which at this time is 6 per cent. The purpose of the hearing is to determine what electric railroads of the United

States are subject to the jurisdiction of the Interstate Commerce Commission under Section 15a. The particular language of that section, which controls the inclusion or exclusion under

the section, is whether or not a specific road is operated as "a part of a general steam railroad system of transportation or engaged in the general transportation of freight."

Mr. Budd Sees Much Progress in 1923

American Association President, in a Statement Released to the Public Press This Week, Reviews the Factors Which Are Contributing to Increased Prosperity in the Industry

IN A STATEMENT for use in the daily newspapers released on Jan. 16, President Britton I. Budd of the American Electric Railway Association gives a brief review of the trend of the electric railway industry in 1923. He sees increased prosperity for both city and interurban lines, but cautions that traffic congestion forms a grave problem. The statement follows substantially in full:

PRESIDENT BUDD'S STATEMENT

Substantial progress was made by electric railways throughout the United States during 1923. This is reflected particularly in the increased number of riders on both city and interurban lines, and great interurban freight business gains. Official reports from one-third of the industry on passengers carried indicate that all records were broken in 1923. During the first eleven months these lines carried an average of 5 per cent more passengers than in 1922, the record year, according to the United States Census reports. Final reports for 1923 will show almost sixteen billion passengers carried if the preliminary report ratio is maintained, as it invariably has been in previous years.

Ability of interurbans to render quick service on short hauls and inclusion of a pick-up and delivery service by many have caused their freight and express business to grow rapidly. Obviously this feature of interurban service is destined to prove a greater factor in the future.

General factors contributing to increased prosperity of both city and interurban lines include: Better equipment and service, regular advertising, elimination of motor bus competition, and a more frequent use of electric railways by motor car owners in order to save money and avoid traffic worries.

Operating revenues have increased 2.5 per cent over 1922, but increased wages, material costs and taxes and slightly reduced fares have offset them to some extent. The operating ratio is up from 72.82 in 1922 to 73.72 in 1923.

Wages, which constitute 46.2 per cent of all electric railway operating expenses, have risen steadily since last spring. The average maximum wages paid by eighty-five representative companies, each of which operates more than 100 miles of track, had increased from 52.84 cents per hour in January to 54.74 cents on Dec. 1. Material and supply costs have advanced about 10 per cent during the year. Taxes have risen 2.43 per cent.

Fares generally are about one-fifth of a cent lower than they were in 1922. Recently, however, there has been an upward tendency in recognition of increased operating costs. Included in cities which experienced fare raises during 1922 are Detroit, with a municipally operated line, and Cleveland, operated under a service-at-cost plan supervised by the city.

The national fare range in 649 cities is from 5 to 10 cents. A total of 173 cities have a 7-cent fare, 150 a 10-cent fare, eighty-three a 6-cent fare and fifty-two a 5-cent fare. Other fares charged in this group are: 10-cent zone fares, four; 9-cent cash fares, four; 8-cent cash fare, 1-cent transfer charge, twenty-six; 8-cent zones, five; 7-cent zones, nine; 7-cent zones, city, 8-cent, outside, four; 6-cent zones, six; 6-cent city zone, 6-cent outside zone and 2 cents transfer charge, ten; two 5-cent fare zones, two; 5-cent fare and a transfer charge, five; 5-cent city zone and 5-cent outside, fifteen.

Weekly passes or permits are being sold in more than thirty cities. Riders find them very satisfactory, but it cannot be said that they would prove profitable for all concerned in every place. They do encourage riding, however.

Companies are coming out of receiverships rapidly. During 1923 properties with a total mileage of 832 and total securities of \$266,588,946 emerged. Companies going into receiverships during the year had only 218 miles of track and outstanding securities of \$23,609,700. The contrast between this record for 1923 and that of 1919, when companies with securities of approximately \$535,000,000 went into receiverships, is striking. [More complete figures collected by ELECTRIC RAILWAY JOURNAL and published in the Jan. 5 issue, page 25, indicate somewhat larger totals for these items, although the comparison is not changed greatly.—EDS.]

Recognition of the fact that cities must have electric railway service is more general than it was a year ago. Saginaw, Mich., after trying for two years to substitute buses for electric cars, gratefully restored electric railway service after taking a popular vote. Davenport, Iowa, took hasty steps to retain service when suspension was threatened. Birmingham, Ala., voters wiped out jitney competition by a ratio of three to one.

This does not mean, however, that the bus has no place in local transportation. The year has seen an enormous

growth in supplemental bus service. More than 100 electric railways are now operating buses, and the future indicates the electric railway companies as the logical market for buses and ultimate domination of bus operations. Heads of electric railway and automotive organizations, realizing the need for co-operation, are getting together on needed legislation.

Probably the gravest problem facing every citizen today is that of relieving traffic congestion in cities. Private automobiles, trucks and buses are increasing so rapidly that the car rider is being delayed. It is unfair to the car riders, their families, business men, and, in fact, the whole community.

Hundreds of millions of dollars are being spent for widening streets for the benefit of automobile traffic in many cities, but no consideration is given to the car rider as to improvements which will give him better and quicker service. Four-fifths of the people do not use automobiles and the favored few who ride in pleasure cars cannot dominate the situation much longer.

City and Interurban Operation

SEVERAL members have been added to the committee on interurban operation as published in the issue of this paper for Dec. 22, page 1056. These are F. B. Culley, Augusta, Ga.; George Newell, Everett, Wash.; Martin Schreiber, Camden, N. J. Mr. Schreiber has also been added to the committee on city operation. G. C. Hecker, special engineer of the American Association, is secretary of each committee.

New York Community Section

UNDER the direction of C. E. Morgan, vice-president and general manager Brooklyn City Railroad, who is chairman of the community section committee of the American Electric Railway Association, the Metropolitan Community Section is being organized in New York City. Applications have been sent out and enrollments are coming in rapidly. The committee is anxious to get this organization well along, so that a meeting can soon be held and the active work started.

Car and Carhouse Wiring

THE committee on car and carhouse wiring of the Engineering Association held its first meeting at association headquarters on Jan. 9. The members present were H. H. Adams, chairman; John Lindall, A. T. Clark and C. G. Keen. H. R. Markle of the Western Association of Electrical Inspectors and chairman of that association's committee on electric traction systems, took part in the meeting. J. A. Brooks and Charles Gordon attended as guests.

A tentative code for car and carhouse wiring was discussed in detail with a view toward working out a set of rules which will be satisfactory from both the operating and the fire protection standpoint.

Equipment

THE equipment committee of the Engineering Association met at association headquarters, New York, on Jan. 14 and 15. Those present were F. H. Miller, chairman, Louisville, Ky.; Daniel Durie, sponsor, Connellsville, Pa.; Walter S. Adams, Philadelphia, Pa.; W. W. Brown, Brooklyn, N. Y.; R. S. Bull, Pittsburgh, Pa.; A. T. Clark, Baltimore, Md.; L. H. Fry, Philadelphia, Pa.; J. L. Gould, New York, N. Y.; J. M. Hipple, Pittsburgh, Pa.; J. C. McCune, New York, N. Y.; A. D. McWhorter, Memphis, Tenn.; J. F. Miller, Pittsburgh, Pa.; E. D. Priest, Schenectady, N. Y.; P. V. C. See, Akron, Ohio; R. B. Smyth, Boston, Mass.; C. W. Squier, New York, N. Y.; W. G. Stuck, Lexington, Ky., and H. G. Ross, representing E. S. Sawtelle of Cincinnati, Ohio.

The various subjects assigned to this year's equipment committee for consideration were discussed. Sub-committees were appointed for working out details and report on each subject. The work to be undertaken by the various sub-committees was outlined and substantial progress was made in devising methods of obtaining and tabulating information, and arriving at definite conclusions.

Subject No. 1 includes a study of gearing, with an attempt to standardize dimensions and locations of web holes. This sub-committee will send out a questionnaire on helical gearing, similar to those used in previous years, regarding the extent to which this type of gearing is used and results obtained. Additional data will be secured from gear and gear blank manufacturers.

Subject No. 2 is a study of various devices for trolley contact and the effect upon trolley wire. The sub-committee on this subject will co-operate with the committee on power transmission and distribution in obtaining information on improvements in contact devices.

Subject No. 3 consists of a review of the miscellaneous methods and practices which were withdrawn from the Manual by last year's equipment committee, with an attempt to revise these and include any additional material necessary to warrant their reinsertion in the Manual. Suggestions were made for including additional material and investigation which would be necessary for collecting and deciding upon data and improvements.

Subject No. 4 covers spring supports for railway motors, with a view to the elimination of undesirable types and the standardization of the more desirable ones. The sub-committee on this subject outlined a series of questions to be used in obtaining data regarding the troubles with springs and motor suspensions and the methods used to overcome these troubles. Information will also be collected on improvements made by various railways in their present motor suspensions.

Subject No. 5 includes a study of existing inspection practice on car axles with a view to developing a practical

set of rules for inclusion in the Manual. This committee will secure information from as many roads as possible so as to assist in developing a standard set of rules.

Subject No. 6 consists of a study of air-brake tests conducted under the auspices of the Central Electric Railway Association. The sub-committee on this subject will digest the principal features included in the report, and additional information will be collected and studied with a view of pointing out methods and results that can be used by electric railways to advantage and that can be investigated further by association committees with a view of obtaining data of importance to electric railways.

Subject No. 7 is a review of existing standards. Additions and revisions to the gages used in wheel mounting and for limit of wear were found necessary due to the new wheel contours adopted at last year's convention.

A new subject, which has been designated as No. 8, to be considered by the equipment committee is a study of bus body dimensions and designs with a view toward standardization. The sub-committee on this subject will co-operate with a similar committee of the American Society of Automotive Engineers.

A.E.R.A. Proceedings for 1923

RAILWAY member companies of the American Electric Railway Association will receive the complete set of the 1923 proceedings for the American and affiliated associations during January. Manufacturer member companies will receive the Engineering Association proceedings only, but copies of the other proceedings will be sent upon request. Individual members will receive the proceedings of the particular association with which they are affiliated.

Special Reports Available

THE following compilations, completed by the association staff, are available and will be sent upon request to member companies in good standing:

Wages of Employees Other than Trainmen: A compilation based on the reports of 175 companies showing their classifications of employees and wages paid in their shop, barn, way and structure, power, overhead line, and stores departments.

Trend of Railway Operations in 1923: A month by month statement of the combined operations of eighty typical electric railways during the ten months ended Oct. 31, 1923, compared with the same months in 1922. Also shows the monthly trend of traffic on these eighty roads since January, 1920.

List of Electric Railways Operating One-Man Cars: A second revision of the list originally issued in April, 1923. This new list shows a total of 426 companies and 10,106 one-man cars.

In addition to the above, supplements to the Wage, Fare Bulletin and the Cost of Living Studies have been prepared, bringing them down to date.

The News of the Industry

Citizen Ownership Urged

Retiring Director of Transit at Philadelphia Finds Regulation Has Not Brought Result Expected

William S. Twining, retiring director of the Department of City Transit, Philadelphia, recently issued his annual report for 1923. Besides recording the year's activities the report explains the relationship between the Philadelphia Rapid Transit Company and the city, and also offers some valuable suggestions from Mr. Twining himself with respect to transit development in the city and vicinity.

CITIZENS SHOULD OWN FACILITIES

Mr. Twining urges customer ownership of Philadelphia's transit facilities, arguing that the present plan of government regulation of the privately owned transportation companies is unsatisfactory, and holds no hope for the proper solution of the city's transit problem. His idea of customer ownership is that of direct ownership by the citizens who need and use the particular service involved. He says that although the principle of regulation was loudly acclaimed many years ago as a cure for all transit troubles, it has not brought the results that were expected. It was his belief that permanent relief would come instead through the business corporation and that the salvation of the industrial civilization lay in the expansion of industrial corporations until they were virtually public in character.

NO PROGRESS TOWARD SOLUTION

Viewing the transit problem only as a problem because of its attempt to combine the functions of the two antagonistic agencies of public service, namely, government and business, he said there was no reason why the people of any community should not organize themselves into a co-operative business corporation whose object is to serve the public with such kind, amount and quality of service as the majority of its stockholders may desire. It was his idea that Philadelphia, with its 2,000,000 people, should form itself into a people's co-operative transit corporation, which should not only acquire the facilities owned by the Philadelphia Rapid Transit Company and its subsidiaries, but would further build, construct and extend facilities into such sections of the city as seemed advisable. He said:

The answer lies in public ownership, but not in political or government ownership. The answer lies in the adoption by the public of the slogan "Every citizen a stockholder," which should replace the one the

company has adopted of "Every employee a stockholder."

Inasmuch as the transit corporation has recently announced its intention of favoring a financial reorganization, I respectfully suggest that the organization be such as will result in a campaign to increase the number of the company's stockholders sufficiently that the company may represent a substantial majority of the citizens and become virtual public ownership.

Referring to the construction activities in 1923 the report says that no progress has been made and that the solution of the matter is back at the same point that it was in 1916. He looked to the future when the moving platform would be the next stage in transit development. This he approved, particularly its use in the central business streets, which are too narrow to accommodate the traffic.

Mr. Twining's report was addressed to Mayor Moore. Its presentation marked the closing of his service to the city as technical adviser on transit matters. His position has been filled by E. H. Ehlers, a review of whose career was recently given in the *ELECTRIC RAILWAY JOURNAL*.

Trackless Trolley Is Favored at Toledo

Toledo's new crosstown line will probably utilize the trackless trolley system if the recommendation of a special sub-committee of the railroads and telegraph committee of the City Council is carried out by the whole body.

The committee has yet to agree upon a route. Two routes are being considered—one 5.5 miles in length and the other 5.95 miles.

The committee upon investigation of various installations reported that the trackless trolley would cost 29.44 cents per car-mile to operate as compared with 36.08 cents per bus-mile for gasoline buses. It was estimated that under the conditions of the installation as proposed this difference would mean an annual saving of about \$26,560 on the system.

It is expected that the Community Traction Company, under the proposed plan, would purchase twelve trackless trolleys and operate them on a twelve-minute headway. This would provide equipment sufficient to give a nine-minute headway in the rush hours night and morning.

The committee has estimated the cost for the 5.5-mile route as follows: Overhead wiring, \$27,500; rolling stock, \$108,000; repair parts, \$2,000; garage, \$20,000; total, \$157,500.

It is expected that action will be taken soon on the proposal by the new Council.

Dynamiters Plead Guilty

Four Men Indicted in Connection With Buffalo Outrage Against International Railway Admit Overt Acts

Four striking employees of the International Railway, Buffalo, who are under indictment with sixteen others for alleged conspiracy to dynamite the Buffalo-Niagara Falls high-speed train on the International in August, 1922, at Ellwood, N. Y., during the last strike, have entered pleas of guilty before Federal Judge George S. Morris of New Hampshire, sitting in special term of the United States District Court in Buffalo. Those who pleaded guilty are: Emory Cheuning, Buffalo; Alvin Heinemann, George S. Galloway and Edward C. Sands, Lockport.

At the request of the United States District Attorney, Judge Morris deferred sentence.

Indictment against four others who were said to be implicated in connection with the case were dismissed at the suggestion of District Attorney Donovan on his plea of lack of evidence. The names of the men whose cases were dismissed are:

Albert T. O'Connor, George S. Reed, Frank McKurth, Charles Launder.

All the others under indictment, including John M. Parker, Niagara Falls, Ont., president of the Buffalo local of the Amalgamated Association, and Clarence E. Conroy, business manager of the local, have entered pleas of not guilty with the exception of State Senator Robert C. Lacey. Mr. Lacey has not yet appeared in court. He is out on bail.

Mr. Parker is a member of the Board of Aldermen in Niagara Falls, Ont., and Messrs Conroy and Lacey were candidates for the Buffalo City Council at the last municipal election. Both were defeated.

The overt acts named in the indictment against Heinemann, and to which he entered a plea of guilty, charges the theft of a large quantity of dynamite from a magazine of the Morris Hardware Company in Lockport on the night of Aug. 14, 1922. The explosive, the government alleges, was brought to Buffalo by Francis Reilley, a striking platform man, and stored at his home, 285 Chester Street. The next day it was taken, it is alleged, by John C. Hurley, a striking employee, to his home at 91 Woodlawn Avenue. Mr. Hurley has pleaded not guilty to an additional charge of perjury in addition to conspiracy.

It is alleged by the government that on the night of Aug. 17, 1922, the dynamite was taken from Mr. Hurley's home

by two other striking trainmen to a spot about 3 miles from the Buffalo city line near the town of Ellwood. Here it was placed, it is alleged in indictments against the men, on the Buffalo-Niagara Falls high-speed line tracks and was exploded when a three-car train filled with tourists from Philadelphia passed over it. Forty-two passengers were injured and the train was wrecked.

Subway Extension from West Philadelphia Discussed

Thomas E. Mitten, chairman of the executive committee of the Philadelphia Rapid Transit Company, and General W. W. Atterbury, vice-president of the Pennsylvania Railroad, called on Mayor Kendrick on Jan. 16 to discuss his plans for a city beautiful.

The Mayor's program includes the building and gradual development of a new City Hall on the site bounded by the Parkway, Arch Street, Broad Street and Fifteenth Street, and the removal of Broad Street Station of the Pennsylvania Railroad together with the elimination of the "Chinese wall," making available this greater business area. The new station, it is understood, will be built on the west bank of the Schuylkill River, and suburban traffic eastward will flow into the subway.

A general revision of traffic control also was discussed, and finally it was decided the Mayor's consulting engineer, Solomon Swaab, together with his Director of Transit, Prof. H. E. Ehlers, will confer with E. B. Temple, chief engineer of the Pennsylvania Railroad, and Ralph Senter, chief engineer for the Philadelphia Rapid Transit Company, who will work out and submit plans covering this proposed development.

The Mayor explained the idea is that this entire program shall be developed step by step, causing no tax rate increase, and improvements contemplated will be made with the money available. Each unit of improvement, he said, will fit into and harmonize with his comprehensive plans for a city beautiful.

Suggestions from Employees Solicited at Buffalo

Herbert G. Tulley, president of the International Railway, Buffalo, is urging all employees to send in suggestions looking toward the improvement of the service, increased safety and better working conditions. Notices of the new plan have been posted in all car houses and shops and at the offices and the stations along the local and interurban lines of the company.

A special form has been prepared which employees are urged to fill in and send to President Tulley direct. All the information thus obtained will be treated confidentially. Eligibility for advancement in position will be considered for those who by information or suggestion show marked ability. The blue suggestion card carries the caption, "Knowing Why Makes Doing Easier."

On Jan. 15, the day that the plan became effective, more than fifty-five suggestions were received. A separate card must be used for each suggestion.

Commission's Authority Upheld

State Supreme Court Says Wisconsin Body Has Power to Allow One-Man Operation

The operation of one-man cars in Milwaukee and the right of the Wisconsin Railroad Commission to regulate such matters have been upheld in a decision by the Wisconsin Supreme Court.

The matter came before the court in a test case instituted by the city to determine whether a Milwaukee ordinance adopted by the Common Council to prohibit operation of these cars within the city limits is ineffective and whether the authority of the Railroad Commission to regulate such questions supersedes that of the city. The Milwaukee ordinance provides that all cars must be operated by two men. Some time ago the Common Council instructed the city attorney to test the validity of the ordinance.

The decision of the court upholds the contention that the powers of the Railroad Commission superseded those of the City Council in regulating Milwaukee's railway service. The case before the court grew out of an order issued by the Railroad Commission permitting the Milwaukee Northern Railway to run one-man cars in the city. Appeal from this order was taken by the city before Judge E. Ray Stevens of the Dane County Circuit Court at Madison. When the lower court upheld the right of the commission to make orders respecting "regulation, practice and service" the case was carried to the Supreme Court. Indirectly involved in this test case was the validity of the state law giving the Railroad Commission supervision and control over the street railway systems in Wisconsin.

In his decision, Justice Doerfler said in part:

It appears that within the proper constitutional limitations the supreme power to create and maintain a proper standard for service rests primarily in the Legislature, and the Legislature cannot divest itself of this power by delegating it in part or in whole to a municipality.

It constitutes the original source of power. In other words, it is the very fountainhead of power, and such power continues under all circumstances. The Legislature being the creator of municipal powers, its creature cannot at any time possess power superior to it.

In order to furnish reasonably adequate service a railroad must possess and maintain proper facilities, which embrace a proper roadbed, tracks, cars, and so forth, and without facilities it would be idle to attempt to establish and maintain proper service, and the same is equally true as to the manning of a car with a crew for operating purposes.

One-man cars are now operating on three lines of the Milwaukee Electric Railway & Light Company and the city lines of the Chicago, North Shore & Milwaukee Electric Railway and the Milwaukee Northern Railway. The Milwaukee Electric Railway & Light Company proposes to install one-man cars on its Clybourn Street line.

Winthrop More Daniels Made Cuyler Professor at Yale

The Association of Railway Executives has established at Yale University a professorship of transportation in memory of T. De Witt Cuyler, Yale '74. The endowment for this chair amounts to \$125,000 and represents gifts from members of the association and friends of Mr. Cuyler.

Winthrop More Daniels who resigned from the Interstate Commerce Commission last year to accept a professorship at Yale, will be the first incumbent of the Cuyler professorship. Mr. Daniels's field is in the economics of transportation, and he has written much of economics and public utilities. He taught at Princeton from 1892 to 1911, when he became a member of the Board of Public Utility Commissioners of New Jersey, and served on the Interstate Commerce Commission from 1914 to 1923.

Mild Weather Helps Operation

Up to Jan. 1 this winter electric railway systems in cities in eastern Canada are said to have expended for the removal of snow not more than 20 per cent of all the money spent up to the similar date last winter. This season there have been very few snowstorms and unless the weather suddenly becomes very severe the companies appear to be in a position to profit greatly. The Moncton Tramways, Electricity & Gas Company, for the first time in many years, has been able to operate its system during the winter. In previous years, the service has been entirely discontinued early in December and not resumed until the snow disappeared in April. When the railway withdrew a bus service was substituted.

Wage Schedules Extended in Milwaukee

A new wage agreement to run until June 30, 1924, has been negotiated between officers of the Employees' Mutual Benefit Association and executives of the Milwaukee Electric Railway & Light Company. The new agreement just negotiated provides for an extension of present wage schedules and working conditions for the next six months after which time a new agreement will be entered into embodying developments within that interval.

Railway Service Must Be Resumed in Spartansburg

The South Carolina Supreme Court in a decision handed down on Jan. 14 orders resumption of service by the South Carolina Gas & Electric Company in Spartansburg. In this the city wins a victory in that it is granted the mandamus petition to require the company to "restore its lines and operate the same according to law." The litigation in the case has been going on for a year. From time to time outstanding events in the controversy have been referred to in the **ELECTRIC RAILWAY JOURNAL**.

Substantial Improvement Reported in New York City

Combined Results for Year Ended June 30, 1923, Show Surplus for First Time in Five Years—2,577,812,855 Cash Fares Paid—439 Rides per Capita—\$479,000,000 Invested in Rapid Transit Lines

CONSIDERABLE improvement is reported by the New York Transit Commission during 1923 in the general transit situation in New York City. The commission also reports substantial progress in the effort it has made both to provide additional transit facilities and to secure better service through the existing facilities. These improvements were summarized by the commission in its report presented to the Legislature on Jan. 14.

The aggregate net annual deficit in the operation of the entire transportation system of the city—subway, elevated and surface lines—has been wiped out. The figures for the fiscal year ended June 30, 1923, with both the gains and losses of the individual companies taken into account, show a net operating income or surplus, for the combined companies, of \$1,549,270. For the fiscal year ended June 30, 1922, there was an aggregate net deficit of \$2,043,760; for the year ended June 30, 1921, \$16,914,256, and for the year ended June 30, 1920, \$10,725,522.

This the commission lists first in its review of the accomplishments. It then refers to the fact that the Brooklyn Rapid Transit Company, after four years and a half of operation under a receiver, has, with the exception of two minor subsidiaries, been completely reorganized and placed in a position under which the purchase of badly needed new equipment may be financed and materially better train and car service provided.

It says that the financial condition of the Interborough Rapid Transit Company has continued to improve under the readjustment plan promoted by the commission and ratified by it in 1922, a plan which considerably reduced the fixed charges borne by the company, including the cutting of the rental annually paid the Manhattan Railway for use of the elevated structures leased by the Interborough company, from \$4,200,000 to \$1,800,000, these gains permitting a corresponding increase in the financing and in the effectiveness of the service, both subway and elevated.

It is pointed out that for the first time in the history of New York City representatives of the public, nominated by the commission and accepted by the companies, are sitting as members of the boards of directors of both the Interborough Rapid Transit Company and the New York Rapid Transit Corporation, the corporate successor of the Brooklyn Rapid Transit Company. The Transit Commission insisted upon recognition of this principle of public representation as a prerequisite of its approval of the organization plans of both companies, and the results of such

representation, the commission says, have been in every way satisfactory.

The elevated lines of the Manhattan company in the boroughs of Manhattan and the Bronx have recovered a loss of 25,000,000 passengers shown for 1922, as against the year preceding, and show an additional gain of more than 7,000 for the year 1923.

With the approval of the commission, the Richmond Light & Railroad Company, which is the principal surface car company serving Staten Island, has been taken out of a three-year receivership and purchased by new interests, already actively engaged in providing for its rehabilitation.

NEARLY SEVEN HUNDRED CARS PURCHASED

Since the beginning of 1922 the companies of every description operating within the city have purchased a total of 682 new cars, of which 200 were for steam railroad service, 250 for subway service and 232 for trolley service. In addition, orders for a further installment of 150 subway cars are to be placed in the near future. These car purchases, already financed, include 200 subway cars by the Interborough company, 50 subway cars by the New York Rapid Transit Corporation, 200 surface cars by the Brooklyn City Railroad and 32 cars by other surface railway operators. In addition, nearly 250 surface cars have been rebuilt for use upon various lines. Of the total of entirely new cars, 600 will be in service by the end of 1924, representing in the aggregate the greatest addition to rolling stock equipment for the city lines in many years.

The commission refers to the opening of the Flushing extension of the Queensboro subway, a distance of a mile and a half, at a cost of \$4,600,000, and to the extension of the Fourth Avenue

subway, now operated by the New York Rapid Transit (B.-M. T.) from Eighty-sixth Street to Fort Hamilton, a distance of half a mile, the estimated cost of which is \$1,900,000.

It is expected that the Fourteenth Street-Eastern subway of the Brooklyn-Manhattan system, which has been under construction since 1916, will be completed and placed in operation as far as Meserole Street, in the Bushwick section of Brooklyn, a distance of about 4 miles, during the late spring or early summer. This line extends from Sixth Avenue, Manhattan, under Fourteenth Street, to the East River, and under several thoroughfares in the Williamsburg district, to its temporary terminal. Plans are also being made for the proposed extension of this line to East New York as a subway rather than as an elevated structure, a further distance of 3½ miles. This entire line, including completed and uncompleted portions, will cost approximately \$25,000,000.

The extension of the Queensboro subway from the Grand Central station to Eighth Avenue in Manhattan, placed under construction by the commission in the early part of 1922, is about one-third finished.

The commission says that helpful and promising co-operation with the Board of Estimate and Apportionment has been established through the acceptance by the board in June last of a suggestion by the commission that it appoint a conference committee to consider the matter of the laying out of further new subway routes and all other matters that may from time to time require the concurrent action of the two bodies. Through the medium of the conferences that have followed the appointment of this committee, agreements have been reached upon the following routes, substantial sections of which it is planned to place under construction during 1924:

(a) The West Side-Washington Heights line, which will run south from 193d Street and Fort Washington Avenue in upper Manhattan as a four-track line, with two tracks connecting with the Brooklyn-Manhattan subway at Fifty-ninth Street and Seventh Avenue and two extending south from Fifty-ninth Street, by way of Eighth Avenue, to the Pennsylvania station. This line is estimated to cost \$65,000,000. Its length will be approximately 8.6 miles.

(b) The Brooklyn Crosstown subway, running from Long Island City, in the Borough of Queens, through the Greenpoint, Williamsburg and central sections of Brooklyn to a point of connection with Manhattan, by way of the existing Fourth Avenue subway, at Fulton Street and Ashland Place. The length of this line is 7.4 miles and its estimated cost, \$38,000,000.

The commission is again enabled to report encouraging progress in the working out of the details of the proposed general plan of reorganization and readjustment of all the lines operating within the city. A tentative plan of reorganization was presented to the public and reported to the Legislature some two years ago. Hearings, covering a number of months, were later held upon the various details under consideration, and a large amount of testimony taken, particularly with relation to the values to be determined as a basis for the admission of the properties of particular companies in the plan ultimately

CLASSIFIED TABLE OF ACCIDENT REPORTS

From all railroad companies for ten months ended Oct. 31, 1923

	Total of All Companies
Car collisions.....	1,167
Persons struck.....	1,816
Vehicles struck.....	21,616
Boarding.....	6,185
Alighting.....	5,457
Electric shocks.....	289
Derailments.....	2,291
Other accidents, including traffic delays..	22,066
Total.....	60,887
Injuries reported	
Passengers.....	21,377
Employees.....	10,402
Others.....	3,771
Total.....	35,550
Serious (included in above)	
Killed.....	229
Fractured skulls.....	101
Amputated limbs.....	10
Broken limbs.....	279
Other serious.....	954
Total.....	1,573

to be agreed upon. Many matters of detail relating to the plan have had the commission's further consideration during the year. The completion of the process of valuation of properties, as well as the preparation of forms of agreement to be entered into between the companies and the commission, on behalf of the city, in the event of final ratification, have involved intensive study, both by the members of the commission and their staff of legal, accounting and engineering experts. A number of more or less related problems are still under discussion, the solution of some of which will have a bearing upon the final structure of the reorganization plan itself. The commission has also deemed it wise to await the completion of the immediate reorganization of some of the larger transportation companies which have been in receivership before attempting to make the plan effective. In this connection the commission explains that in the last analysis its dealings are with the owners of the properties involved and not with the courts by whom the receivers were appointed.

As the commission sees it, the restoration of these properties to their owners will operate to facilitate the final reorganization, and incidentally serve to cut away a good deal of the cumbrous structure of previous street railway financing. In all of the reorganizations that have taken place during the past two years, the commission has insisted, in fact, that the rearrangement of the affairs of any of the companies, financial and otherwise, should be so shaped as to pave the way toward their absorption in the comprehensive plan. The commission says it will be equally insistent in respect of the plan of the reorganization of the New York Railways, operating a substantial part of the surface roads in Manhattan.

Two new receiverships were created during 1923, when, early in January, the lines of the New York & Queens County Railway not subject to the Steinway Railway mortgage—the latter lines having been placed in receivers' hands in 1922—were unable to meet their obligations and went into the hands of a receiver, and during December, when a receiver was named for the New York & Long Island Traction Company, operating in Queens County and outside the city in Nassau County.

The commission reiterates its position in respect to the operation of buses. It says that its attitude has been repeatedly and clearly set forth, should not be misunderstood and must not be mistaken. The commission believes, and has frequently stated, that buses should be an integral part of the transportation system of New York City. As feeders for rapid transit lines or as distributors at certain points of passengers from rapid transit lines, buses can be made to serve a very useful purpose that no other facility can adequately provide. Their use for through operation or long-haul operation in New York is, under the street

congestion conditions which exist, of doubtful value. Probably they cannot be so used effectively. The commission says it has repeatedly announced its willingness to co-operate in any legitimate way to place upon the streets buses, properly constructed, properly equipped and manned, under responsible management and with sufficient resources behind them. It believes that a real bus operation, expressed in terms of service, would be of lasting benefit to the traveling public of the city and would supplement existing facilities in such a way as materially to help conditions of congestion, which cannot entirely be relieved until new rapid transit trunk lines are provided.

SUBURBAN TRAFFIC PROBLEM

The commission continued during 1923 its investigations and studies in respect to the need of future provision for the handling of suburban passengers within the city of New York. The growth of suburban areas adjacent to New York City has been very rapid in recent years. Within a radius of 50 miles of New York City Hall, which comprises generally the suburban commutation traffic area, there was, on the basis of the 1920 Federal census, a population of substantially 8,800,000 persons, including the five boroughs of the city. This population was divided substantially two-thirds within the munic-

2,577,812,855 passengers, an increase of 86,604,045 over the previous year. In terms of percentages this increase was 3.48. The figures do not include the results of operation upon the Hudson & Manhattan Railroad lines, which are not properly a part of the New York City transportation system and carry relatively a small number of the passengers between local stations in New York. The figures also do not include 55,974,110 passengers carried by the Fifth Avenue Coach Company. In 1860 each person within the communities which roughly today comprise the city of New York rode forty-three times a year upon the transportation lines. In 1923 the riding had increased to 439 trips per capita.

For the first time since 1918, as stated previously, the combined financial returns of the street railroad companies showed a net corporate income of \$1,549,270, instead of a deficit. Operating revenue for the year, for all companies, amounted to \$138,455,485, or about \$5,000,000 more than for the year previous. Operating and maintenance expenses were \$96,323,696, or a little less than \$4,000,000 more than in 1922. Taxes, tolls, etc., in 1923, were \$17,986,067, or approximately \$99,000 more than in 1922. The accompanying table shows the results of operation from the financial standpoint from the years 1908 to 1923, inclusive.

RESULTS OF OPERATION OF STREET RAILWAYS IN NEW YORK CITY
Fiscal Years Ended June 30, 1908-1923
(Excludes Hudson & Manhattan Railroad)

Fiscal Year Ended June 30	Street Railway Operating Revenue	Expenses of Maintenance and Operation	Taxes, Tolls, etc.	Street Railway Operating Income (a)	Net Corporate Income (b)
1908.....	\$68,804,197	\$41,075,378	\$4,313,851	\$23,414,968	\$2,782,585
1909.....	71,538,312	40,930,824	4,918,453	25,689,035	6,321,627
1910.....	77,356,451	42,615,837	5,025,503	29,715,111	9,540,526
1911.....	80,948,588	44,851,455	5,316,346	30,780,787	10,224,404
1912.....	84,862,972	46,416,134	5,595,847	32,850,991	11,863,193
1913.....	88,448,788	47,314,442	5,863,232	35,271,114	11,574,125
1914.....	90,379,410	48,638,663	5,637,679	36,103,068	11,849,985
1915.....	89,965,346	48,900,450	5,548,121	35,516,775	11,501,157
1916.....	94,717,678	50,523,325	5,955,536	38,238,817	12,352,438
1917.....	95,943,519	54,204,314	6,891,049	34,848,156	8,739,442
1918.....	98,820,096	58,464,097	7,900,289	32,455,710	4,659,330
1919.....	104,565,318	72,980,401	7,570,659	24,014,258	Loss 9,328,434
1920.....	121,632,966	92,322,912	6,940,316	22,369,738	Loss 11,410,387
1921.....	129,237,751	103,293,674	7,027,590	18,916,487	Loss 17,159,155
1922.....	133,452,687	92,422,503	7,887,319	33,142,865	Loss 2,704,752
1923 (c).....	138,455,485	96,323,696	7,986,067	34,145,722	1,549,270

(a) Excess of revenues over expenses and taxes. (b) Balance after interest, rents and other fixed charges.
(c) Provisional.

ipality and one-third within the suburban area. Figures collected by the commission for the calendar year 1922 show that the trunk line railroads carried a both-way passenger traffic of 227,301,338 passengers. In addition, the Hudson & Manhattan Railroad, operating a subway line from two terminals in Manhattan to Newark, Jersey City and Hoboken, transported in and out of New York 37,291,763 local passengers aside from its Newark rapid transit traffic and the traffic received by it from railroad companies.

In 1860, the first year of which there is accurate record, horse-drawn cars in Manhattan and Brooklyn carried about 50,800,000 passengers. In the last fiscal year ended June 30, 1923, the street railroads and rapid transit railroads of New York together transported

There were reporting to the commission at the end of the fiscal year sixty-five common carriers, seven less than in 1922. The sixty-five common carriers include fifty-four street and electric railways, ten steam railroads and three stage-coach corporations. The reorganization of the Brooklyn Rapid Transit Company brought about a number of changes in the capitalization of the companies comprising that system. The New York Rapid Transit Corporation, owing to the exigencies of the reorganization, had not completed its annual report for the fiscal year at the end of 1923. Excluding the Hudson & Manhattan Railroad, and noting the exception as to the figures for the Brooklyn company, the several common carriers making full annual reports to the commission have a combined net

STREET RAILWAY TRAFFIC (INDICATED BY NUMBER OF CASH FARES) IN NEW YORK CITY, 1860-1923, WITH
PARTIAL DISTRIBUTION BY BOROUGH (Excludes Hudson & Manhattan Railroad)

Fiscal Year Ended June 30	Street Surface Railways					Total	Rapid Transit	Grand Total	Per Capita
	Manhattan	The Bronx	Brooklyn	Queens (Excl. B. R. T.)	Richmond				
1860.....	38,455,242	.....	12,374,931	.....	.....	50,830,173	.....	50,830,173	43
1870.....	114,101,539	1,036,014	37,203,281	.....	121,086	152,463,920	.....	152,463,920	103
1880.....	148,615,107	1,775,485	77,928,395	1,052,380	213,905	229,585,272	60,831,757	290,417,029	152
1890.....	215,296,648	3,394,726	109,288,647	2,976,185	287,325	331,243,531	237,906,029	569,149,560	218
1900.....	360,002,672	21,364,690	204,106,397	11,441,751	6,872,856	603,788,366	242,564,692	846,353,058	246
1910.....	371,165,696	56,524,261	289,308,085	34,430,074	11,712,623	763,140,739	725,282,196	1,488,422,935	312
1911.....	382,046,845	62,777,966	305,977,350	42,515,629	12,301,757	805,619,547	745,525,416	1,551,144,963	320
1912.....	395,238,026	67,837,245	322,321,981	45,182,732	12,959,799	843,539,783	779,439,926	1,622,979,709	329
1913.....	419,722,253	74,702,309	345,987,401	47,463,382	13,568,066	901,443,411	809,563,028	1,711,006,439	341
1914.....	420,662,533	79,652,133	351,905,284	49,973,696	14,011,414	916,205,060	836,947,406	1,753,152,466	343
1915.....	415,551,116	81,502,803	354,700,113	52,686,108	14,312,009	918,752,149	829,914,163	1,748,666,312	337
1916.....	427,373,847	84,535,737	363,630,177	54,167,403	14,884,534	944,591,698	890,850,383	1,835,442,081	348
1917.....	349,788,114	71,153,030	373,079,651	50,906,681	15,238,157	860,165,633	990,089,597	1,850,255,230	345
1918.....	371,136,389	79,917,071	360,207,555	43,448,206	15,287,922	869,997,143	1,029,165,648	1,899,162,791	349
1919.....	370,084,711	80,806,261	362,105,288	46,723,575	15,958,198	875,678,033	1,118,215,449	1,993,893,482	360
1920.....	349,772,761	94,141,991	432,936,227	49,562,574	15,007,235	941,420,788	1,331,915,745	2,273,336,533	405
1921.....	384,128,024	107,675,507	418,106,603	51,944,034	15,797,894	977,652,062	1,418,649,471	2,396,301,533	420
1922.....	388,357,767	114,679,520	472,538,028	58,826,451	18,567,125	1,052,968,891	1,438,239,919	2,491,208,810	430
1923.....	383,209,500	119,140,781	490,128,692	59,849,701	19,408,180	1,071,736,854	1,506,076,001	2,577,812,855	439

STREET RAILWAY TRAFFIC IN NEW YORK CITY, 1921-1923

Number of Revenue Passengers (Cash Fares). Excludes Hudson & Manhattan Railroad

	Fiscal Year Ended June 30—			Increase* of 1923—	
	1921	1922	1923	Number	Per Cent
Subway and elevated lines:					
Interborough					
Subway	639,385,780	644,975,474	676,650,431	31,674,957	4.91
Elevated	374,293,051	348,517,216	348,524,700	7,484	0.00
Brooklyn Rapid Transit elevated and subway	404,970,640	444,747,229	480,900,870	36,153,641	8.13
Total.....	1,418,649,471	1,438,239,919	1,506,076,001	67,836,082	4.72
Street surface lines in:					
Borough of Manhattan	384,128,024	388,357,767	383,209,500	D5,148,267	D1.33
Borough of the Bronx	107,675,507	114,679,520	119,140,781	4,461,261	3.89
Borough of Brooklyn	418,106,603	472,538,028	490,128,692	17,590,664	3.72
Borough of Queens (a)	51,944,034	58,826,451	59,849,701	1,023,250	1.74
Borough of Richmond	15,797,894	18,567,125	19,408,180	841,055	4.53
Total.....	977,652,062	1,052,968,891	1,071,736,854	18,767,963	1.78
Grand total.....	2,396,301,533	2,491,208,810	2,577,812,855	86,604,045	3.48
Population (b).....	5,705,364	5,790,680	5,875,996		
Fares per capita.....	420	430	439		

* The prefix D indicates decrease. (a) Exclusive of Brooklyn Rapid Transit. (b) Estimated on basis of one-tenth of decennial increase, 853,165.

capitalization, in round figures, of \$1,168,003,000, of which the city of New York appears with \$266,845,000, the major portion of its capital investment of approximately \$290,000,000 in rapid transit lines.

TRAFFIC INCREASES

The traffic increase for the fiscal year 1923 upon all of the street railway lines, which include the subways and elevated railroads, was a few million less than in the previous year. The figures do not include any of the traffic on steam railroad lines nor upon the electrically operated divisions of such roads. The major increase of the year was upon the rapid transit and surface lines operated by the Brooklyn companies. With total traffic for the year of 480,900,870 upon these lines, there was an increase of 36,153,641 or 8.13 per cent. In 1922 the chief gain appeared upon the surface lines in Brooklyn, although in both instances the gain was much larger than in 1923. The principal change, however, reflected in the transportation figures for the fiscal year appears in respect to the lines of the Interborough Rapid Transit Company. Up to last year, for a period of several years, this company had shown substantial, and in a few instances unusual, gains in traffic.

In the 1922 fiscal year, however, due to a 25,000,000 passenger traffic reduction upon the elevated lines, the company showed an increase of less

than 6,000,000 for all lines over the previous year, the 1921 figures over 1920 having been 53,000,000. This year, however, the Interborough subway lines showed a gain of 31,674,957 passengers, or 4.91 per cent, while the elevated lines of the same system, which in 1922 lost about 25,000,000 passengers, this year showed a gain of 7,484 passengers. This increase upon the elevated lines was due in part to congestion of traffic on other routes, which diverted many passengers to them, and in part to a campaign undertaken by the Interborough on behalf of the elevated railroads, when an increase of express service and other physical changes were made in passenger service.

The total traffic upon the rapid transit lines of both systems amounted in 1923 to 1,506,076,001, which was a gain of 67,836,082 passengers, or, expressed in terms of percentages, of 4.72 per

cent. The total traffic for 1923 upon the street surface lines in the several boroughs amounted to 1,071,736,854, which was a gain of 18,767,963. The largest traffic, 490,128,692, and the largest gain numerically, 17,590,664, was in Brooklyn. This was a gain of 8 per cent. In the Borough of Manhattan the surface road traffic of 383,209,500 represented a falling off from the year before of 5,148,267, or 1.33 per cent. The next largest traffic was in the Borough of the Bronx, with 119,140,781, an increase of 4,461,261, or 3.89 per cent. Surface traffic in the Boroughs of Queens and Richmond showed gains, that in Richmond representing a gain in per cent of 4.53. The percentage gain for all surface lines throughout the city was 1.78, and for all street railroad lines 3.48. On an estimated population of 5,875,996, at the end of the fiscal year 1923, per capita riding was 439, against 430 in the previous year.

2,577,812,855 PASSENGERS IN A YEAR

The accompanying tables show (1) the number of revenue passengers reported by the several systems, the estimated populations of the city of New York and the average number of rides per capita for the fiscal years 1921, 1922 and 1923, and (2) the street railway traffic in 1860, 1870, 1880, 1890, 1900, and for every year from 1910 to 1923 inclusive.

The amount of securities authorized by the commission in the calendar year 1923 aggregated \$97,063,000 par value and 1,025,906 shares of no par stock, as shown in the table below.

The expenses of the commission for the year 1923 totaled \$2,431,971.86.

STOCK AND BOND ISSUES AUTHORIZED BY THE COMMISSION IN 1923

Companies	Class of Security	Date of Authorization	Amount of Issue Authorized	Amount Applied for	Case No.
Eighth Ave. Railroad	Mortgage bonds	June 13, 1923	\$100,000	\$100,000	2625
Richmond Railways Inc.	Bonds	March 27, 1923	1,700,000	2,000,000	2664
Ocean Electric Railway	Stock	March 27, 1923	*[20,000 shs.]	*[20,000 shs.]	2664
Brooklyn Rapid Transit	Stock	March 13, 1923	315,000	315,000	2673
reorganization plan..	Bonds	March 23, 1923	92,698,000	x93,000,000	2679
	Stock, pref. common		*[239,556 shs.]	*[350,000 shs.]	
			*[766,350 shs.]	*[850,000 shs.]	
Interborough Rapid Transit	Equipment etc.	Dec. 14, 1923	2,250,000	2,250,000	2627
Total bonds.....			\$97,063,000	\$97,665,000	
Shares of no par stock.....			[1,025,906 shs.]	*[1,220,000 shs.]	

* No par stock. x Approximately. * Not exceeding.

Foreign News

Hydro-Electric Resources in France

One of the best known French authorities, Monsieur Cavaille, who was responsible for the operation of French railways during the war, states that the unexploited hydro-electric possibilities are of unquestioned sufficiency for the supply of the general railway systems of France, and of local and interurban tramways as well. He estimates that the country's hydro-electric resources susceptible of immediate development are 6,000,000 hp. in the Alps-Rhone and Jura, 1,800,000 hp. in the Pyrenees and 1,500,000 hp. in the mountains of Auvergne and the Massif Central.

Before the war France had developed but 900,000 hp. of this, while Italy, far less prolific in natural resources, had already developed above a million horsepower in the Alps alone. In 1921 the figures for France were increased to 1,775,000 hp., of which 600,000 hp. was in the Pyrenees and the Massif Central.

Railway Electrification in England

The leading British steam railway companies have now announced their large programs of new works, many of which are to be expedited in order to relieve unemployment. Among the schemes which the London, Midland & Scottish Railway will put in hand is the electrification of the line from Manchester to Oldham. This will form an addition to the electric lines already existing for dealing with the heavy traffic north of Manchester.

Award to Belgrade Tramways

During the war the tramways of Belgrade, which belong to a Belgian company, were seized by the municipal administration. An arbitration committee sitting in Brussels has finally awarded the Belgian company an indemnity of 16,000,000 francs. The settlement will be placed in the joint hands of the Belgian and the Serbian-Croatian governments.

British Tramways and Local Taxation

Voluminous tables showing the profits and losses on municipal undertakings, including tramways, by which the taxes have been reduced or increased, are contained in the annual statement of the borough treasurer of Preston, Lancashire, covering local taxes levied for the year 1923-24 in the principal towns of England and Wales. It appears that in thirty towns the tramways have received aid from taxes, while in nineteen towns the tramways made profits which were contributed to

the relief of taxation. This compares with thirty-seven and eleven towns respectively the previous year.

Rotterdam Tramways Receipts

The general meeting of the Rotterdam Tramways has passed upon the general operating accounts for the fiscal year ended Nov. 30, 1923. While the receipts for the year amounted to 6,338,688 florins, those in the last six months were but 2,381,758 florins.

Prague Street Railway Shows Profit

The electric light and street railway properties of Prague, Czechoslovakia, which are municipally owned and operated, earned a net profit for the city treasury of 4,746,000 crowns (1 crown equals approximately 3 cents at current exchange) during the calendar year 1922, according to the report of operations which the city has recently made public. Gross revenues from both sources combined during that year amounted to 268,872,000 crowns, combined operating expenses to 229,436,000 crowns, and gross profits were 39,436,000 crowns. Of the latter amount 14,954,000 crowns went for interest on loans and amortization and 19,736,000 crowns for depreciation, leaving the net profit indicated above.

The operating statement shows that the electric street car lines had gross revenues of 135,700,000 Czechoslovak crowns and total expenditures of 134,700,000 crowns.

According to the city record, these properties have yielded uninterrupted net profits in varying amounts since 1904. These two properties, as well as the city gas and water works, are subject to a first mortgage under the \$7,500,000 city of Greater Prague fifty-year 7½ per cent bonds, issued in the United States in the spring of 1922, simultaneously with £1,500,000 issued in London under the same conditions. The operating results of the street railway and electric light properties are therefore of more than casual interest to American readers.

The city's financial estimates for the operation of these properties in the year 1924 have not yet been completed. Projects that will probably be carried out during the year include extensions of street railway lines to suburban districts, the installation of certain new transmission lines, the possible establishment of electric bus lines as "feeders" in outlying districts, and in the power plants a replacement of steam engines by steam turbines. At the present time the Ringhoffer Works, in Prague, is engaged on a contract for the delivery of thirty electric motor cars for the street railway lines.

Diesel Engines for Automotrices

Since the International Tramways Congress to be held in Paris in 1924 is to discuss the development of the automotrice as a supplementary feeder for electric and railway lines, the Swiss firm of Sulzer Frères is coming forward with the heavy oil Diesel motor idea for this purpose. Recent developments of this firm include a 200-hp. engine, of which two have been built and are soon to be operating on the mountain system of the Société Régional du Val de Travers. The Swiss Federal Railways proposes to make use of a somewhat more powerful unit. The same Swiss firm, through its French affiliation, is also experimenting with a similar motor for use in the French colonies, to run on any of the vegetable oils produced in considerable quantities. This is another development of the idea that France should be self-sustaining. The automotrices of Morocco at present are operated entirely with gasoline, largely from United States sources.

Paris Underground Extension

The new spur of the Paris Metropolitan Underground, running from the Invalides station of the Opera-Auteuil line to the Croix-Rouges-Sevres station of the Nord-Sud line, is now open for service. The line will ultimately be opened to the Place de la République, some 2 miles distant, on which section work has already greatly progressed, and would have been completed except for the lull caused by the war and the adjustments of credits since that period.

Glasgow Tramway Extension

In the latter part of December the Glasgow tramways were linked up with the lines in Coatbridge and Airdrie, towns lying a few miles to the east of Glasgow. While these lines were acquired some time ago by Glasgow Corporation, the construction of a connecting link has only recently been completed, so that the lines might be operated together.

Change-Giving Machines in London Stations

The latest device to be adopted by the London Underground Railway for accelerating the booking of passengers is the change-giving machine. This new machine, which has been installed at a number of stations, coupled with the "automatic" and "rolltic" ticket-issuing machines, makes the process of issuing tickets and supplying change a very rapid one. If, say, half a crown is tendered for a 2d. ticket, the pressing of a button of the automatic machine delivers the ticket to the passenger's hand. At the same time the half-crown coin is inserted into the change-giving machine, and pressing two keys causes it to eject 2s. 4d. Tests show that the operation of supplying a ticket and change can be carried out in four seconds.

Financial and Corporate

Properties to Be Separated

Electric Railway Securities Company Will Take Over Railways Included in Commonwealth Company

As the final step in a program begun nearly two years ago for the separation of the ownership of the power and light properties from that of the electric railways of the Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., the stockholders are being notified of a plan to distribute one share of common stock of the Commonwealth Power Corporation and one-half share of the Electric Railway Securities Company, a new holding company, for each share of Commonwealth Power, Railway & Light Company common stock. The power corporation will represent ownership of the power and light properties and the securities company will represent ownership of the street and interurban railways.

STOCKHOLDERS AUTHORIZE INCREASE

Preliminary to making this distribution, the Commonwealth Power Corporation is calling a special meeting of its stockholders for Jan. 28 for the purpose of increasing its authorized no par value common stock from 180,000 shares to 200,000 shares. The additional 20,000 shares will be delivered to the Commonwealth Power, Railway & Light Company at \$35 per share under a contract entered into Nov. 27, 1922, for the acquirement of the United Appliance Company and coal properties now being operated in connection with Commonwealth Power Corporation properties. The Commonwealth Power, Railway & Light Company has contracted to sell the 20,000 shares to Hodenpyl, Hardy & Company, Inc., New York, at the same price. This sale does not carry with it any stock in the Electric Railway Securities Company. The \$700,000 thus realized together with other assets will provide for the company's outstanding indebtedness.

An initial dividend of \$1 per share has been declared upon the common stock of the Commonwealth Power Corporation for the quarter ending April 30, payable on May 1 to stockholders of record April 18, 1924.

The Commonwealth Power, Railway & Light Company was organized in 1910 and acquired control of important power, light and electric railway properties principally in Michigan, Ohio, Indiana and Illinois, and developed them to a high state of efficiency. Its favorable progress was interrupted by abnormally high costs due to the war, and its effects, which were especially severe upon the railway properties, and the separation of the power and light

properties from the railway properties was determined upon in May, 1922, to enable the company better to finance its requirements.

Warrant Basis Again in Seattle

The Seattle Municipal Street Railway went back on a warrant basis for a four-month period on Jan. 10, following a decision of the Seattle Clearing House Association that the lines' warrants should be honored over that period. According to E. L. Blaine, chairman of the finance committee of the City Council, the losses sustained by the railway department last spring and summer, when the 5-cent fare was in effect, are responsible for the present situation. At that time, it was found necessary to make loans from the bond redemption and interest funds to the operating fund, amounting to more than \$600,000, a part of which has been paid back.

According to a statement of City Treasurer Ed Terry, the railway department on March 1 will face a deficit of \$400,000 in annual redemption payments falling due at that time. In order to meet the payments, it will be necessary to divert daily receipts to the redemption fund, and ask the banks to carry the operating expenses of the lines.

Plans for retiring warrants amounting to more than \$375,000 monthly have been worked out by Mr. Blaine and D. W. Henderson, superintendent of railways, so that each bi-monthly warrant issue will be retired before the end of the four-month period. The last issue, covering operating expenses payable on April 25, will be retired on May 1, and on May 10 the department will be back on a cash basis, Mr. Blaine states.

Payment Made on Toledo Bonds

Payment of a 25 per cent distribution on the bonds of the Toledo & Western Railroad, Toledo, Ohio, has been approved by Judge John M. Killits in the Federal Court at Toledo. The property was sold at receiver's sale to the Doherty interests some months ago. The price was \$600,000. The present distribution will be \$250 on each \$1,000 bond of the Toledo & Western Railroad first mortgage bonds, but does not include the bonds of the Toledo, Fayette & Western. There were \$1,250,000 of the Toledo & Western and \$250,000 of the Toledo, Fayette & Western first mortgage bonds outstanding. The present distribution amounts to approximately \$312,500.

Reorganization of the company has been delayed another month while several plans are being worked out. The receivers are still actively in charge of the road.

Nevada County Traction Seeks to Abandon Service

The Nevada County Traction Company has applied to the California Railroad Commission for authority to remove its tracks and abandon service in the cities of Grass Valley and Nevada City.

The applicant sets forth in its petition that due to the diversion of traffic to the private automobile and the motor bus its revenue is not now sufficient to pay the cost of power used in operating the line between Grass Valley and Nevada City. Its equipment is in such a state of disrepair that it is now impossible to render either safe or efficient service.

The company applied to the Board of Supervisors of Nevada County and the City Councils of Nevada City and Grass Valley for consent to abandon its entire system and trackage, which consent was granted conditional upon substituting therefor a motor bus service.

The board of directors of the company has refused to sanction such a course, and two applicants having applied to the Railroad Commission for certificates to operate motor bus service between Grass Valley and Nevada City, the traffic will be served in case either applicant is granted a certificate to operate such a service.

Financing New Work a Problem at New Orleans

Following the meeting of the board of directors of the New Orleans Public Service, Inc., on Jan. 11 R. S. Hecht, chairman of the board, issued a statement in which he pointed out some of the obstacles standing in the way of obtaining the money needed to cover required construction as set forth in the estimates submitted by the engineering and executive committee.

Anent this matter Mr. Hecht is quoted as saying:

The board is dealing with a difficult problem in finding the money for these requirements, inasmuch as the company's new 5 per cent bonds, which a year ago were sold at 90 are now selling on the market at 82, and to float any additional bonds of that issue would not only further depress the market, but would greatly increase the cost of the new money.

While the executive committee has not met to determine these matters, there is every indication that, even after some curtailment, the reasonable requirements for new work and equipment will amount to from \$5,000,000 to \$6,000,000 this year. Substantially the same amount was expended for new work and additional facilities in 1923 out of the funds provided for at the time of the reorganization.

At a conference held on Jan. 12 in the office of Commissioner Murphy, of the Department of Public Finance, at which there was a full representation of the Commission Council, with the exception of Mayor McShane, it was agreed that a meeting be held later in the month with the officials of the Public Service, Inc., to receive their plans for financing the additional equipment desired by the New Orleans Public Service, Inc.

The corporation is seeking authority

to get the needed money for betterments and improvements, but whether this will take the form of additional stock or bond issues has not yet been determined. The Commission Council is disposed to favor the issuance of bonds, as the law of Louisiana prohibits the selling of stock at less than its face value. This is also in keeping with the agreement with the city.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were sold on Jan. 16 ten shares of North Carolina Public Service Corporation preferred, \$86 a share.

Deficit in November.—The Tacoma Municipal Street Railway, ("Tide Flats" line) Tacoma, Wash., earned an operating income of \$8,450 during November, 1923. There was a deficit, however, of \$3,137 after all operating depreciation and debt charges were made against the line.

Dividend Declared in Madison.—The Madison Railways, Madison, Wis., has declared a semi-annual dividend at the rate of 7 per cent together with a bonus at the rate of 1 per cent per annum on the full paid preferred shares of the stock of that company issued subsequent to March 1, 1922. The dividend is payable on Feb. 1.

Meeting Called to Consider Dissolution.—A meeting of stockholders of the Tiffin & Fostoria Railway has been called for Jan. 21 to consider acting upon the "proposed dissolution of said corporation and the surrender and abandonment of its corporate charter and franchise." The company operates a 14-mile line connecting Tiffin and Fostoria, Ohio.

Gold Bonds Offered.—Halsey, Stuart & Company, New York, are offering at 98½ and interest yielding more than 6.58 per cent \$2,000,000 of the first mortgage lien 6½ per cent gold bonds, series D, of the Kentucky Utilities Company, Somerset, Ky. The bonds are due Sept. 1, 1948, and are non-callable prior to Sept. 1, 1933. The Kentucky Utilities Company, with its subsidiaries, serves sixty-one communities in Kentucky, Virginia and Tennessee with one or more classes of public utility service.

Sale of Power House Property Confirmed.—Judge Julius Mayer, in the Federal District Court, has signed an order confirming the sale of the power station of the New York Railways at First Avenue and Ninety-sixth Street, New York City, to the New York Edison Company. The property was sold as a result of foreclosure proceedings.

Oversubscription of Stock Offering Gratifying.—Employees of the New York State Railways recently oversubscribed the recent offer of a limited amount of the company's stock. Six hundred shares had been offered to the employees and as the company had no stock for sale it was, therefore, in no way benefited other than through the closer relationship thus established with its employees. James F. Hamilton, Rochester, N. Y., president, has ex-

pressed his gratification over the result of the stock offering. To those who were unfortunate enough to be too late to receive the stock an opportunity will be extended under the same terms and conditions except that the stock will be purchased in the open market and at the best price then obtainable.

Purchased Line in Operation.—The Bryan-College Traction Company, recently organized at Bryan, Tex., has taken over the operation of the inter-urban line from Bryan to College Station, site of the Agricultural & Mechanical College of Texas, about 5 miles distant from Bryan. Officials of the company report that bus competition has not interfered with operation of the line. The officers of the company are: Eugene Edge, president; E. H. Austin, vice-president; J. M. Gordon, treasurer, and James Sullivan, secretary. The company purchased the line and equipment from S. D. Hunter of San Antonio last July when the property was sold under foreclosure. Preparations had been made to junk the line.

Approval of \$750,000 Second Mortgage Sought.—The New York Transit Commission on Jan. 14 held a hearing on the application of the Eighth Avenue Railroad, New York City, for permission to place a second mortgage of \$750,000 upon its carhouse property on the west side of Eighth Avenue between Forty-ninth and Fiftieth Streets. This mortgage, if approved, would either secure existing certificates of indebtedness to the same amount, of which \$611,200 is outstanding, or would become security for an issue of \$750,000 to retire these certificates. In either event, the company would be in a position to obtain \$138,000 in cash, the amount of the certificates still held in its treasury, which is needed for improvements. The hearing was continued until Jan. 20.

Line Resumes.—The Shawnee-Tecumseh Traction Company, Shawnee, Okla., which was put out of business by the October flood, is again operating. The owners agreed to restore service if granted an increase in fare to 25 cents. The public went on record in favor of the increase, and the company filed its application with the Corporation Commission for the higher fare.

Railway Abandons System.—Authorization to abandon and discontinue its railway system has been granted by the State Public Service Commission to the Fort Scott & Nevada Light, Heat & Power Company, Nevada, Mo. Evidence was introduced at a hearing before the commission on Oct. 31 at Nevada to show that the system had been operated at a loss during the past six years. The company proposes to substitute buses and operate them at the same fares as paid on the cars.

Holding Company Debentures Offered.—Public offering was made on Jan. 11 of a new issue of \$10,500,000 of Standard Gas & Electric Company, Chicago, convertible 6½ per cent gold debentures, due on Jan. 1, 1954. The

bonds are priced at 93½ to yield 7 per cent. The underwriting group is composed of H. M. Byllesby & Company, the Federal Securities Corporation, Janney & Company and Hambleton & Company. The purpose of the new issue is to refund three of its maturities, including \$2,000,000 of 7 per cent gold notes due in 1925, an issue of \$2,500,000 of 7 per cent convertible bonds due in 1937, and an issue of \$2,695,000 of 7½ per cent bonds due in 1941. The company operates about 40 miles of electric railway through its ownership of the Northern States Power Company.

Net Income Falls Off.—The Department of Street Railways, city of Detroit, realized a total revenue of \$1,886,857 for the month of November. The main item was \$1,799,220, derived from transportation. In November, 1922, the total operating revenue amounted to \$1,593,120, which included \$1,499,984, the revenue from transportation. The total operating expenses for November, 1923, were \$1,401,541, against \$1,107,092 for the same month in 1922. The net revenue showed a slight decrease, being \$486,028 in November, 1922, and \$485,316 in November, 1923. The net income fell off from \$91,768 to \$60,579 in November of the year just ended. In November, 1923, 39,071,049 passengers were carried, against 37,103,301 in November, 1922.

Service Resumed.—Service was resumed on Jan. 13 on the Athol & Orange Street Railway, Greenfield, Mass., temporarily interrupted by the canceling of its liability policy by an insurance company. The restoration of service followed an arrangement by townspeople to assume the liability risk, the amount of which had been scaled down by the receiver.

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The franchise provides a fare within Warren of 10 cents cash, six tickets for 50 cents, and in the Warren zone of the interurban line a fare of 15 cents cash, ten tickets for \$1. The cash fare is an increase of 5 cents, in each case.

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to get the needed money for betterments and improvements, but whether this will take the form of additional stock or bond issues has not yet been determined. The Commission Council is disposed to favor the issuance of bonds, as the law of Louisiana prohibits the selling of stock at less than its face value. This is also in keeping with the agreement with the city.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were sold on Jan. 16 ten shares of North Carolina Public Service Corporation preferred, \$86 a share.

Deficit in November.—The Tacoma Municipal Street Railway, ("Tide Flats" line) Tacoma, Wash., earned an operating income of \$8,450 during November, 1923. There was a deficit, however, of \$3,137 after all operating depreciation and debt charges were made against the line.

Dividend Declared in Madison.—The Madison Railways, Madison, Wis., has declared a semi-annual dividend at the rate of 7 per cent together with a bonus at the rate of 1 per cent per annum on the full paid preferred shares of the stock of that company issued subsequent to March 1, 1922. The dividend is payable on Feb. 1.

Meeting Called to Consider Dissolution.—A meeting of stockholders of the Tiffin & Fostoria Railway has been called for Jan. 21 to consider acting upon the "proposed dissolution of said corporation and the surrender and abandonment of its corporate charter and franchise." The company operates a 14-mile line connecting Tiffin and Fostoria, Ohio.

Gold Bonds Offered.—Halsey, Stuart & Company, New York, are offering at 98½ and interest yielding more than 6.58 per cent \$2,000,000 of the first mortgage lien 6½ per cent gold bonds, series D, of the Kentucky Utilities Company, Somerset, Ky. The bonds are due Sept. 1, 1948, and are non-callable prior to Sept. 1, 1933. The Kentucky Utilities Company, with its subsidiaries, serves sixty-one communities in Kentucky, Virginia and Tennessee with one or more classes of public utility service.

Sale of Power House Property Confirmed.—Judge Julius Mayer, in the Federal District Court, has signed an order confirming the sale of the power station of the New York Railways at First Avenue and Ninety-sixth Street, New York City, to the New York Edison Company. The property was sold as a result of foreclosure proceedings.

Oversubscription of Stock Offering Gratifying.—Employees of the New York State Railways recently oversubscribed the recent offer of a limited amount of the company's stock. Six hundred shares had been offered to the employees and as the company had no stock for sale it was, therefore, in no way benefited other than through the closer relationship thus established with its employees. James F. Hamilton, Rochester, N. Y., president, has ex-

pressed his gratification over the result of the stock offering. To those who were unfortunate enough to be too late to receive the stock an opportunity will be extended under the same terms and conditions except that the stock will be purchased in the open market and at the best price then obtainable.

Purchased Line in Operation.—The Bryan-College Traction Company, recently organized at Bryan, Tex., has taken over the operation of the inter-urban line from Bryan to College Station, site of the Agricultural & Mechanical College of Texas, about 5 miles distant from Bryan. Officials of the company report that bus competition has not interfered with operation of the line. The officers of the company are: Eugene Edge, president; E. H. Austin, vice-president; J. M. Gordon, treasurer, and James Sullivan, secretary. The company purchased the line and equipment from S. D. Hunter of San Antonio last July when the property was sold under foreclosure. Preparations had been made to junk the line.

Approval of \$750,000 Second Mortgage Sought.—The New York Transit Commission on Jan. 14 held a hearing on the application of the Eighth Avenue Railroad, New York City, for permission to place a second mortgage of \$750,000 upon its carhouse property on the west side of Eighth Avenue between Forty-ninth and Fiftieth Streets. This mortgage, if approved, would either secure existing certificates of indebtedness to the same amount, of which \$611,200 is outstanding, or would become security for an issue of \$750,000 to retire these certificates. In either event, the company would be in a position to obtain \$138,000 in cash, the amount of the certificates still held in its treasury, which is needed for improvements. The hearing was continued until Jan. 20.

Line Resumes.—The Shawnee-Tecumseh Traction Company, Shawnee, Okla., which was put out of business by the October flood, is again operating. The owners agreed to restore service if granted an increase in fare to 25 cents. The public went on record in favor of the increase, and the company filed its application with the Corporation Commission for the higher fare.

Railway Abandons System.—Authorization to abandon and discontinue its railway system has been granted by the State Public Service Commission to the Fort Scott & Nevada Light, Heat & Power Company, Nevada, Mo. Evidence was introduced at a hearing before the commission on Oct. 31 at Nevada to show that the system had been operated at a loss during the past six years. The company proposes to substitute buses and operate them at the same fares as paid on the cars.

Holding Company Debentures Offered.—Public offering was made on Jan. 11 of a new issue of \$10,500,000 of Standard Gas & Electric Company, Chicago, convertible 6½ per cent gold debentures, due on Jan. 1, 1954. The

bonds are priced at 98½ to yield 7 per cent. The underwriting group is composed of H. M. Byllesby & Company, the Federal Securities Corporation, Janney & Company and Hambleton & Company. The purpose of the new issue is to refund three of its maturities, including \$2,000,000 of 7 per cent gold notes due in 1925, an issue of \$2,500,000 of 7 per cent convertible bonds due in 1937, and an issue of \$2,695,000 of 7½ per cent bonds due in 1941. The company operates about 40 miles of electric railway through its ownership of the Northern States Power Company.

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Personal Items

M. A. Pooler Promoted to Vice-President

M. A. Pooler, general manager of the New Brunswick Power Company, St. John, New Brunswick, Canada, has in addition been elected vice-president of the company. Mr. Pooler assumed the duty of manager of the St. John property in the summer of 1922, severing his seven years connection as general manager of the Potomac Public Service Company. His utility associations also include service with the Pennsylvania-Ohio Power Company of Youngstown, Ohio, which furnishes electric railway, electric light and power service. Mr. Pooler was graduated from Purdue University in Indiana and from the Case School of Applied Science of Cleveland. The New Brunswick Power Company, which operates the local electric railway, is controlled by the Federal Light & Traction Company of New York.

Messrs. Allen, Sylvester and Lunda Promoted

Promotions to four executives connected with the electric railway and other departments of the Wisconsin Public Service Corporation are announced by J. P. Pulliam, vice-president and general manager of the company. They were made to fill vacancies created by the appointment of C. E. Warwick to the newly formed post of director of safety with headquarters in Green Bay. Mr. Warwick was formerly superintendent of the electric railway department of the company.

Gratified with the results achieved by its electric railway department in the safety campaign, the company now plans to adopt similar safety practices and rewards for the electric, power and gas departments, which work will be furthered and supervised by Mr. Warwick. Later on the gospel of safety will be established in the corporation's properties located in Oshkosh, Sheboygan, Marinette and Menominee, Mich.

C. H. Allen, acting superintendent of the Green Bay division of the electric railway department, has been appointed superintendent to succeed C. E. Warwick, while W. H. Sylvester, formerly in charge of the electric department at Green Bay and for some time past acting superintendent of the Manitowoc division of the electric railway department, has been appointed superintendent of the Manitowoc & Northern Railway lines furnishing interurban service between Manitowoc and Two Rivers.

E. M. Lunda, who has been employed as equipment engineer for the electric railway lines, has been appointed master mechanic for the Green Bay and

Manitowoc divisions, which furnished both city and interurban electric railway service.

Fred E. Schornstein Resigns from Eau Claire Property

Fred E. Schornstein has tendered his resignation as district manager of the Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis. It is understood that he will leave within a short time for an Eastern city to take up duties of a similar nature. As district manager of the company Mr. Schornstein had supervision over the electric light and power supply in Eau Claire, Chippewa Falls and numerous other cities and towns throughout that



F. E. Schornstein

section of the state. He also had supervision over the electric railway department operating the city service in Eau Claire and an interurban line in Chippewa Falls, Eau Claire and Altoona.

"Major" Schornstein, as he is known, came to Eau Claire in November, 1920, after being transferred from the company's properties at Red Wing, Minn., where he was in charge of the company's electric light and power department for three years. He was born in Cleveland and worked for several years in various capacities connected with the public utility business.

C. M. Shaw Made Superintendent at Montreal

Announcement has been made by Col. J. E. Hutcheson, general manager of the Montreal Tramways, that C. M. Shaw had been promoted from the position of assistant superintendent to that of superintendent, replacing the late A. J. Gadoua. Taking Mr. Shaw's position is W. Branchaud, who was secretary of the traffic department.

Mr. Shaw entered the service of the Tramways in 1903, as clerk in one of the offices. Later he was transferred

to the head office and passed through several promotions before becoming head of the schedule department. He next was made assistant superintendent. Mr. Branchaud started in the accounting department.

Messrs. Mellinger and Stahle Promoted at York

Jacob H. Mellinger, who has been assistant superintendent of the York Railways, York, Pa., since 1906, has been made superintendent, and James A. Stahle, another employee, has been promoted from dispatcher to assistant superintendent.

Both promotions were made in recognition of faithful and efficient service rendered over a period of many years. Mr. Mellinger entered the service of the company in 1882 as night foreman in the carhouse. He was promoted to the superintendency in 1895 and remained at that post until 1906, when the financial holdings of the concern were taken over by Brown Brothers, Philadelphia. At that time the personnel of the company was rearranged and Mr. Mellinger was given the title of assistant superintendent.

Mr. Stahle entered the employ of the railway twenty-one years ago as a motorman.

Changes in Personnel of Northwestern Pacific

W. J. Cummings, district freight and passenger agent of the Northwestern Pacific Railroad at Eureka, Cal., has been promoted to assistant general freight and passenger agent with jurisdiction over the entire property. G. H. McMullin, superintendent of the southern division with headquarters at Sausalito, will be superintendent of the northern division with headquarters at Eureka, succeeding W. J. Hunter, who, having reached the age of seventy, has been placed on the company's honor roll. M. L. Gillogly, heretofore industrial assistant to the president and general manager, is to be superintendent of the southern division with headquarters at Sausalito, and T. F. Allen, who has been supervisor of transportation, will be assistant superintendent with the same headquarters. G. H. Hicks, valuation and property engineer, has been appointed chief engineer in charge of all engineering work.

The Northwestern Pacific Railroad operates approximately 40 miles of electric railway connecting Sausalito, San Rafael, Manor and Mill Valley.

Obituary

Edward G. Riggs, since 1913 executive assistant to the president of the New York, New Haven & Hartford Railroad in charge of public relations, died on Jan. 17. Mr. Riggs was sixty-eight years old. He was on the staff of the New York Sun for many years, writing on politics and finance.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Relative Durability of Various Commercial Woods

Among the native woods of the United States, black locust and osage orange are the most durable. When exposed to conditions which favor decay, they will probably last almost twice as long as white oak and from three to four times as long as red oak, according to information recently published by the Forest Products Laboratory. Bald cypress, redwood, catalpa

RELATIVE DURABILITY OF U. S. COMMERCIAL WOODS

White Oak Taken as 100 per Cent

CONIFERS

Cedar, eastern red (juniper).....	150-200
Cedar, southern white	80-100
Cedar, other species	125-175
Cypress, bald	125-175
Douglas fir (dense).....	75-100
Douglas fir (average mill run).....	75-85
Fir (the true fir).....	25-35
Hemlock	35-55
Larch, western	75-85
Pine, jack	35-45
Pine, longleaf, slash (Cuban).....	75-100
Pine, Norway	45-60
Pine, pitch, sugar	45-55
Pine, shortleaf	60-80
Pine, So. yellow (dense).....	80-100
Pine, western white	65-80
Pine, white	70-90
Pine, western yellow, pond, loblolly, lodgepole	35-50
Redwood	125-175
Spruce, Engelmann, red, Sitka, white	35-50
Tamarack	75-85
Yew, Pacific (western)	170-

HARDWOODS

Ash	40-55
Aspen	25-35
Basswood	30-40
Beech	40-50
Birch	35-50
Butternut	50-70
Catalpa	125-175
Chestnut	100-120
Cottonwood	30-40
Elder, pale	25-35
Elm, cork (rock), slippery	65-75
Elm, white	50-70
Gum, black, cotton (Tupelo).....	30-50
Gum, red	65-75
Hickory	40-55
Locust, black	150-250
Locust, honey	80-100
Magnolia, evergreen	40-50
Maple	40-50
Mulberry, red	150-200
Oaks, red oak group	40-50
Oaks, white oak group	100
Oak, chestnut	70-90
Osage orange	200-300
Poplar, yellow	40-55
Sycamore	35-45
Walnut, black	100-120
Willow	30-40

and most of the cedars are also highly durable. Douglas fir, longleaf pine, the white pines, and western larch average only a little less durable than white oak, but hemlock, fir, loblolly, lodgepole and western yellow pine are considerably less durable. Practically all sapwoods have very low durability.

There are not enough records in existence on some of the woods to permit compilation of conclusive data, therefore the durability figures given in the accompanying table are subject to correction. They are based, however,

on the most complete data obtainable, supplemented by observation and expert opinion from many sources.

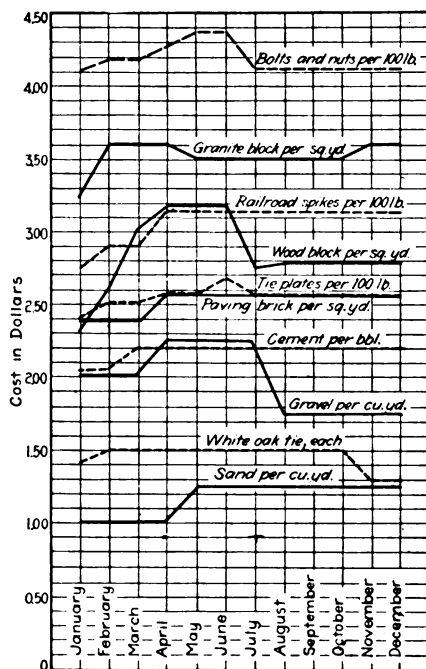
Large Brake Shoe Earnings

Preliminary estimates of the earnings of the American Brake Shoe & Foundry Company for 1923 indicate earnings of between \$12 and \$15 a share on the common stock. This is considerably in excess of the figures for 1922, when the stock earned \$9.60 a share. Dividends have been paid at the rate of \$5 heretofore, and it is thought unlikely that there will be any change in this rate or any extra dividend in the immediate future.

Material Prices Are Becoming Stabilized

The cost of the materials entering into the construction of electric railway track showed comparatively little variation during the year 1923. Such changes as did occur took place for the most part during the earlier months of the year. There has been a noticeable trend toward stabilization during the last six months.

Standard steel rails, both bessemer and open hearth, were quoted at \$43 per ton throughout the year. Similarly the price of angle bars remained steady at 2½ cents per pound throughout the year. Tie plates and railroad spikes varied slightly, as shown in the accompanying chart. The price of bolts



Price Variations of the More Important Material Used in Track Construction

and nuts rose slightly during the early summer, but soon returned to the same figure that prevailed during the early part of the year. White oak ties fluctuated between \$1.30 and \$1.50 each.

Paving materials showed slightly greater variation in price than did track materials. Cement was quoted at Chicago at \$2.05 per bbl. during January and February, 1923, and thereafter for the rest of the year at \$2.20 per bbl. Crushed stone remained constant at \$1.75 per cu. yd. Paving brick, wood blocks and granite blocks were quoted at higher figures in December than in January last year.

The price trend, shown in the accompanying chart, indicates a fairly well stabilized level for construction materials. It agrees with the statement on the subject of electric railway general costs quoted in the ELECTRIC RAILWAY JOURNAL for Jan. 5, page 18.

25 per Cent Increase for G. E.—Bath Plant Purchase Denied

For the full year of 1923 the orders received by the General Electric Company, Schenectady, totaled \$304,199,746. This is an increase of approximately 25 per cent over the 1922 figures, which totaled \$242,739,527. In the last quarter of 1923 the company booked \$74,452,422 in new business, as compared with \$66,568,333 for the same period the preceding year, or a gain of 12 per cent for the three months.

The company, from its New York office, has denied the report that it was about to acquire the Bath Iron Works, Bath, Me., as an auxiliary plant. It had been rumored that the Bath plant was being sought by the General Electric in the interest of the extension of its turbine building plant.

Air Brush Plant Sold

Good will, patents and all other property of the Dayton Air Brush Company of Dayton, Ohio, were sold at receiver's sale recently in Dayton to George Serapin, Dayton. Operation of the plant, which has been halted for some time, will be resumed by the new owner, it is reported. George W. Simmons, Dayton, was the receiver.

Metal, Coal and Material Prices

Metals—New York		Jan. 15, 1924
Copper, electrolytic, cents per lb.	12.437	
Copper wire base, cents per lb.	15.125	
Lead, cents per lb.	8.00	
Zinc, cents per lb.	6.725	
Tin, Straits, cents per lb.	49.125	

Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$4.825
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons ..	2.00
Franklin, Ill., screenings, Chicago, net tons ..	1.95
Central, Ill., screenings, Chicago, net tons ..	1.675
Kansas screenings, Kansas City, net tons ..	2.25

Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$6.65
Weatherproof wire base, N. Y., cents per lb.	17.50
Cement, Chicago net prices, without bags ..	\$2.10
Linseed oil (5-bbl. lots), N. Y., per gal.	\$9.95
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots ..	11.50
Turpentine, (bbl. lots), N. Y., per gal.	\$1.02

Rolling Stock

Community Traction Company, Toledo, Ohio, will purchase twelve trackless trolleys if the Council accepts the recommendation of its special sub-committee on railroads and telegraphs.

Los Angeles Railway plans to purchase 100 cars and construct twenty more in its own shops.

Illinois Traction System, Peoria, Ill., it is reported, has placed an order with the American Car & Foundry Company for 100 box cars.

Track and Line

Memphis Street Railway, Memphis Tenn., is planning two important extensions for 1924. They are the Overton Park Avenue line from Montgomery to Evergreen and the crosstown line on Bellevue south, which will complete this line from Poplar Avenue to Florida Avenue. This will give access across the city from the southwestern section to the northeastern part of the city. This latter extension will immediately follow the completion of Bellevue viaduct.

Pacific Electric Railway, Los Angeles, Cal., has applied to the Railroad Commission for authority to double-track its line along Lake Avenue south of Washington Street in the city of Pasadena.

United Railways & Electric Company, Baltimore, Md., according to H. Findlay French, director of the Industrial Bureau of the Board of Trade, has tentative plans for the expenditure of \$1,750,000 during 1924. He says this covers way and structures, rolling stock and power expenditures, the largest amount being for track reconstruction. Several automatic substations will be placed in operation. During 1923, he said, the company spent about \$1,185,000, the major part of which was for track and reconstruction.

Los Angeles Railway plans to extend six car lines in 1924 which will involve 10 miles of trackwork. Reconstruction of more than fifty single track miles is contemplated in the coming year. One of the biggest track rebuilding jobs is to be done on Central Avenue from Fourteenth Street to Slauson. The company has on order 2,000 tons of rails, costing \$150,000. Substation and other power facilities necessitated by the extension of lines and the increased number of cars will involve an expenditure of more than \$200,000.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., proposes to build an extension from its Lakeside power plant west through Tippecanoe and the town of Lake.

Texas Electric Railway, Dallas, has completed an extension of its lines in

Waco, Tex., affording service to the Baptist Sanitarium. The extension was built at a cost of \$16,000.

Janesville Traction Company, Janesville, Wis., during 1923 rebuilt six blocks of city track and replaced sections of the city with new overhead wires.

Madison Railways, Madison, Wis., spent approximately \$40,000 last year in double-tracking and relocating rails and for its share of street paving.

Power Houses, Shops and Buildings

Dubuque Electric Company, Dubuque, Iowa, will take possession of the Ryder Building in July. Besides the general office and display rooms the building will house a recreation center for the employees.

Pacific Electric Railway, Los Angeles, has been granted permission by the Railroad Commission to abandon and remove the waiting station at Second and Hill Streets, Ocean Park, and to substitute a standard type station.

Trade Notes

General Electric Company, Schenectady, N. Y., has appointed Herman W. Schroeder district auditor of the southwestern district, following the recent creation of this district. Mr. Schroeder was first employed as a bookkeeper for the Southwest General Electric Company in 1911. Under the new arrangement he will have charge of accounting, credits and collections in the General Electric southwestern district, as distinguished from the Southwest General Electric Company, distributing jobber.

Henry M. O'Brien, formerly assistant to the president of the Midvale Steel & Ordnance Company-Cambria Steel Company, Philadelphia, has joined the Central Industrial Service Company, Frick Building Annex, Pittsburgh. This announcement was recently made by W. W. Groves, president of the Central Industrial Service Company. Mr. O'Brien will serve in the capacity of vice-president and will be active in the management of the business. Prior to his connection with Midvale Steel & Ordnance Company-Cambria Steel Company, Mr. O'Brien was in the executive department of the Carnegie Steel Company at Pittsburgh.

Springfield Railway Equipment Company, Springfield, Mo., has filed articles of incorporation for the purpose of manufacturing a "car replacer or re-railer" for use in cases of derailment. The shareholders are George B. Orr, George H. Hunter and J. W. Hughes, who comprise the first board of directors.

New City Car Company, Chicago, manufacturer of railroad cars and supplies, has been incorporated with 50,000

shares of preferred stock, \$100 par value, and 50,000 shares common stock, non-par value. The New York office of the company is Forks, Erie County.

Bridgeport Brass Company, Bridgeport, Conn., announces that its Philadelphia office has been moved from the North American Building to the Bankers Trust Building.

New Advertising Literature

Driver-Harris Company, Harrison, N. J., has issued a fifty-five page booklet on alloys for electrical resistance. It contains some useful data for the engineer in chart form together with statistics on temperature resistance curves.

Roller-Smith Company, New York, N. Y., has issued Bulletin No. 210, descriptive of ammeters, voltmeters and accessories.

Hasler-Tel Company, New York, N. Y., has issued a pamphlet on the Hasler speed indicator. Besides describing the speed indicator the pamphlet names representatives of 19,493 users of the Hasler.

Dossert & Company, 242 West Forty-first Street, New York, have just received from the press the twentieth year catalog of Dossert solderless connectors for stranded and solid wires, rods and tubing. It marks a very substantial enlargement over previous catalogs in the matter of data and information, brought up to the minute. The book further takes up the subject of putting together a typical Dossert joint—illustrating the process completely. Another innovation is the presentation, on a single page, of twelve of the most frequently encountered types of joints and how they can be made into Dossert joints—illustrating the proper Dossert to fit the joint in question. It is a sixty-four-page book.

Consolidated Car Heating Company, New York, N. Y., has for distribution a limited number of its new wall calendars, published the first of the year. The calendar is illustrated with large and very clear pictures illustrating the details and applications of the company's line of electric car specialties, heaters, bell and buzzer systems, automatic ventilators, pneumatic door engines and other devices. Each month's sheet also includes a supplemental month-preceding and month-following calendar.

Combustion Engineering Corporation, New York, N. Y., has issued Bulletin AH-1, 1923, on the CEC air heater, "a plate type of heater which has demonstrated its ability to increase power plant furnace efficiency through the recovery of a portion of the heat ordinarily lost in flue gases."

Crouse-Hinds Company, Syracuse, N. Y., has issued folder No. 9 on safety panels and cabinets; also Bulletin No. 2054 on condulets of the F. A. series.



PEACOCK STAFFLESS BRAKES

*Look for them
on the modern safety car!*

Now considered essential equipment for the better class of up-to-date one-man, two-man safety cars. You'll find them on Philadelphia's five hundred new cars, Brooklyn's two hundred order, and Detroit's latest one hundred lot. These are but a few of the many Peacock Staffless equipments recently installed.

Consider these special advantages

Safety:—Peacock Staffless Brakes are best for safety cars because they are practically equivalent to the air brake system in braking power, speed, capacity and reliability. They will stop the car on any grade if emergency conditions require.

Platform Space:—Especially desirable because of their compact arrangement. The steel housing projects only a fraction more than three inches into the vestibule.

No Maintenance Expense:—So simple and so rugged that there's nothing to get out of order. So well-made, that they'll outlast the car itself. So well-equipped with graphite bronze bushings, that no lubrication is needed.

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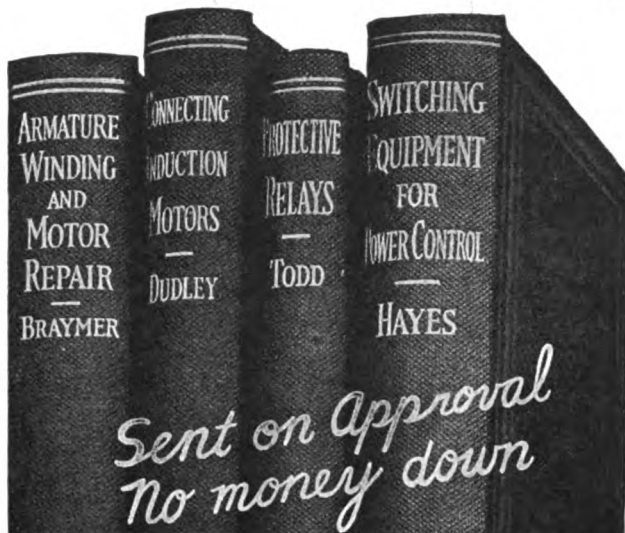
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Bolt Fastenings



4

The 1923 Committee on Way Matters of the A.E.R.A. reported at the Atlantic City convention as follows:

“It was agreed that a substitute tie should meet the following requirements:

- | | | |
|--|---|---|
| 1. Resiliency. | → | The fundamental principle of the DAYTON RESILIENT TIE. |
| 2. Hold rail to gage. | → | Held securely by bolts accurately located in steel cross members. |
| 3. Provide sufficient bearing area. | → | By protecting the concrete from breaking or pulverizing, the Dayton Tie converts the entire roadbed into bearing surface. |
| 4. If expected to last for more than one set of rails, that easily renewable fastenings be provided. | → | Readily accessible bolt fastenings provide for rail renewal. |
| 5. Be easily installed by ordinary track workers. | → | Eight ordinary track laborers, by actual test, have laid 1,000 feet of Dayton Resilient track in a single day. |
| 6. Cost installed should be reasonable.” | → | Dayton Resilient Tie Track costs \$2,000 per mile less than wood ties in gravel ballast. |

Provide for Rail Renewals

The fourth requirement the Way Committee agreed that a "substitute tie" should meet is that of *easy rail renewal*.

The Dayton Resilient Tie meets this requirement with readily accessible bolt fastenings. In case of a change in grade or a change in the height or base of rail, new blocks can be inserted without disturbing the foundation.

Thus, the fourth requirement of the Way Committee is simply met in the Dayton Resilient Tie.

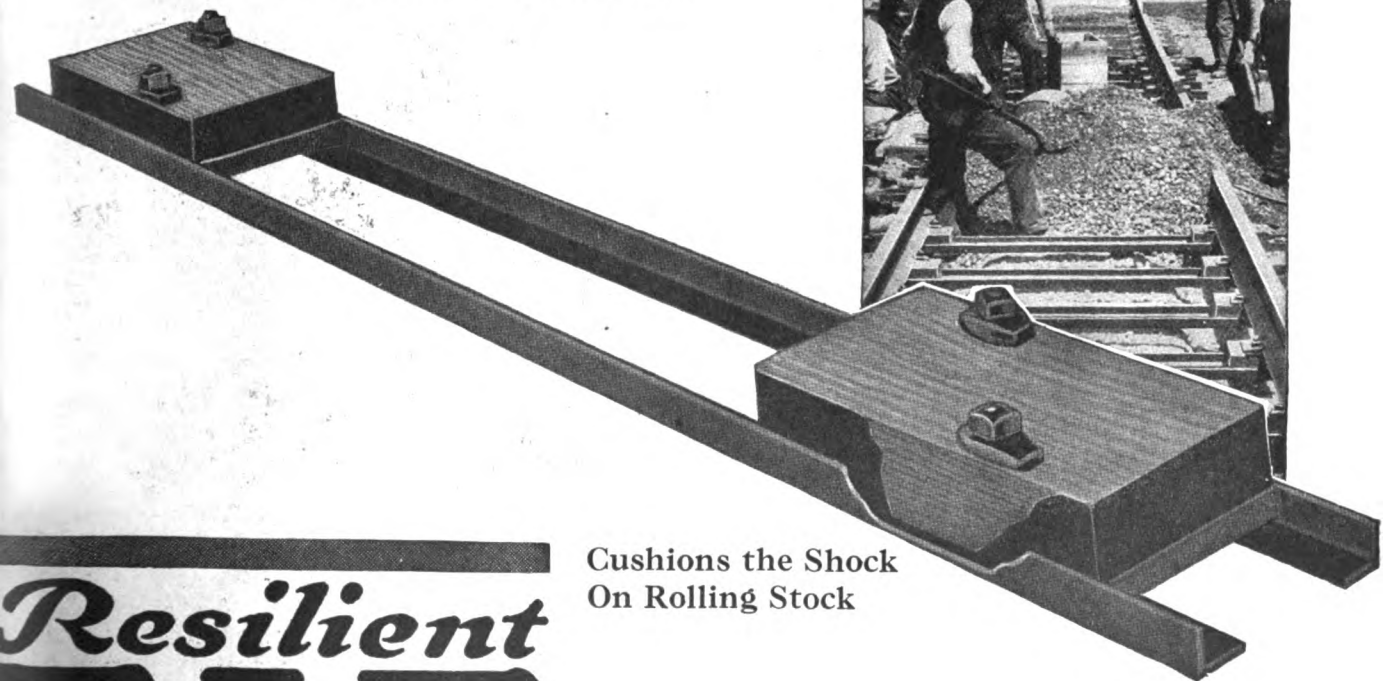
Track laid on Dayton Resilient Ties will last longer than any other construction known to date. But, naturally, no railway construction is everlasting. Therefore, it is encouraging to know that in seeking a tie to take the place of wood, you can get one that provides for easy rail renewal.

The Dayton Mechanical Tie Co.

707 Commercial Building, Dayton, Ohio

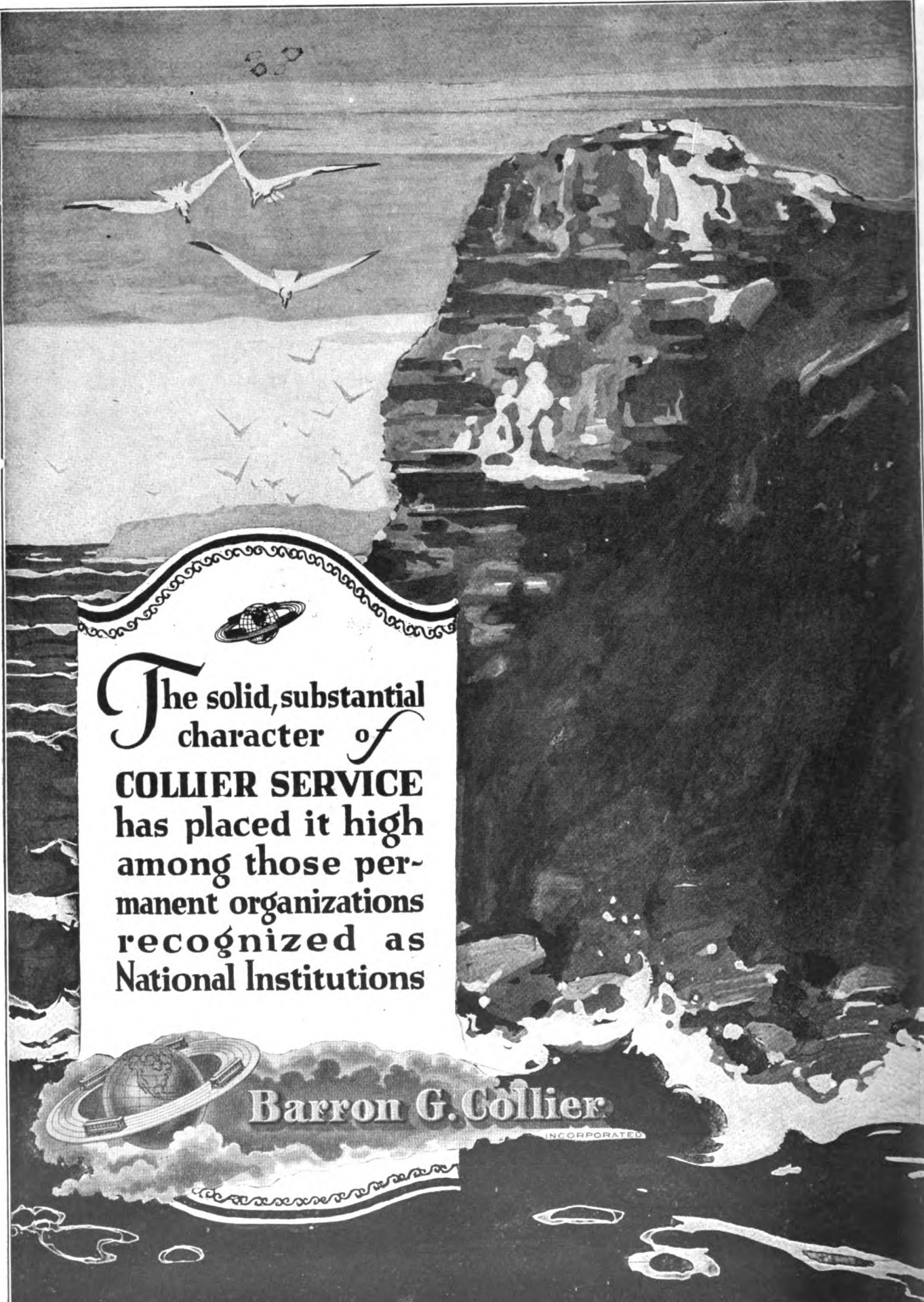
Canadian Representative:

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Cushions the Shock
On Rolling Stock

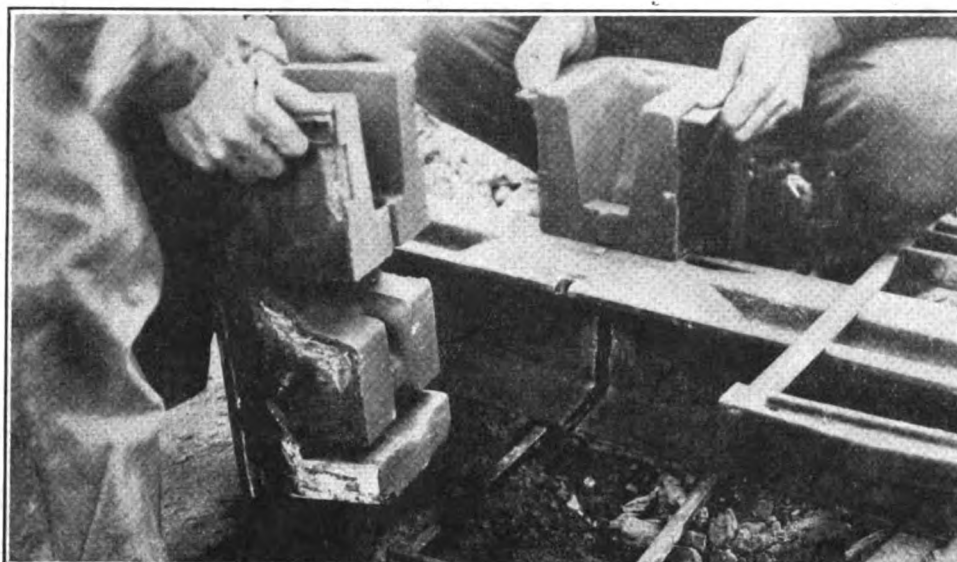
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The solid, substantial
character of
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recognized as
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Banish pavement troubles with jointless track—



The **Thermit Insert Rail Weld** eliminates joints, bonds and "cupping"



Typical loose condition of pavement as result of cupped mechanical joint. Track which does not sell transportation!



Thermit Insert Weld installed in street joint and pavement troubles eliminated.

It isn't so much the actual repair or renewal of a faulty joint that piles up track maintenance costs, as the opening up of the concrete pavement; the replacement of cracked and broken pavement due to "cupping."

And that's when the Thermit Insert Rail Weld means real economy, for it eliminates entirely the rail joint with its attendant bonding. Thermit Welded rail is continuous, the mechanical strength and conductivity of a Thermit Weld is identical with that of the unbroken rail.

Thermit Welds cost no more, and in many cases less, than for less efficient methods. A comparatively small gang can easily handle 35 to 40 a day.

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Take a tip from ancient Sparta— **BOYERIZE!**

Those old Spartans made no bones about the hard life they had to lead. And they didn't see the logic of being encumbered by anybody too soft to stand the strain. So they exposed all their new babies to the elements in a wintry mountain gorge.

Now there's a moral in that for the electric railway man. He just can't afford to be encumbered by brake rigging too soft to stand the strain of "a stop on every block." He'd better "leave it cold" and benefit by the Spartan toughness of **BOYERIZED** parts—with their glossy armor-plate surface, that outwears case-hardened steel *three to four times*.

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Here is the **BOYERIZED** Line

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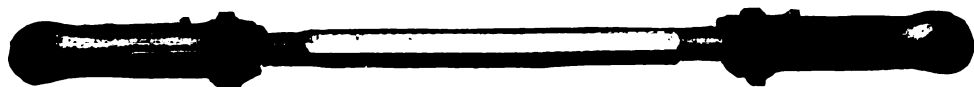


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One of many reasons why wire wear is less

The long, deep groove and smooth sliding contact make Miller Shoes cling to the wire with less than the usual upward pressure. This means less friction and consequently less wear.

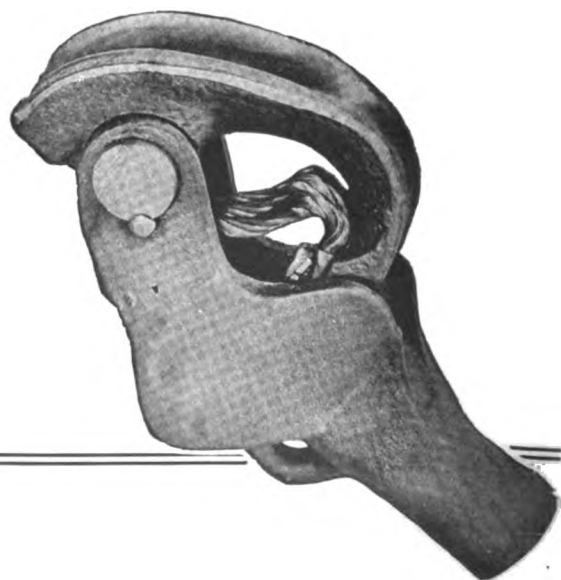
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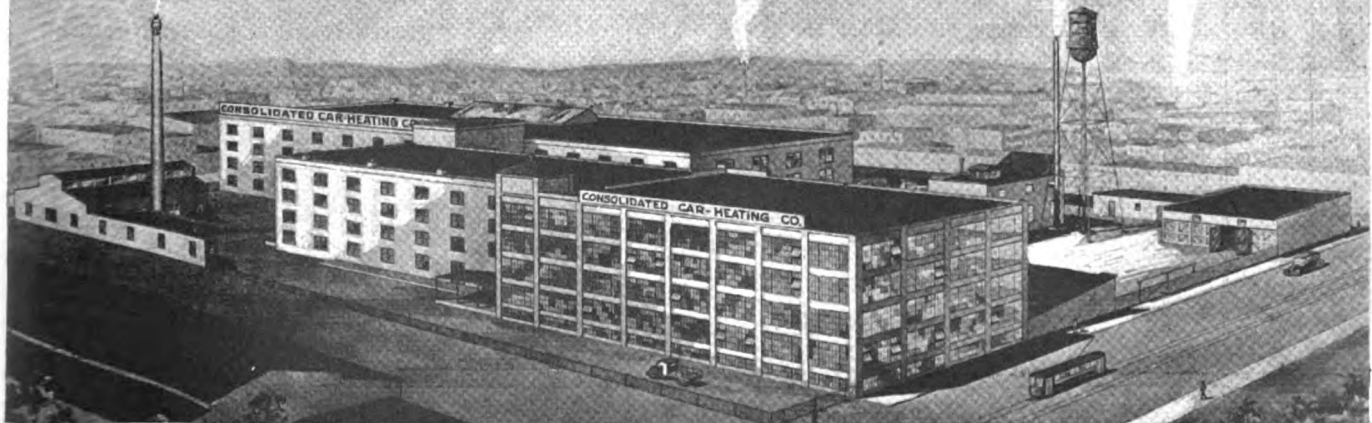
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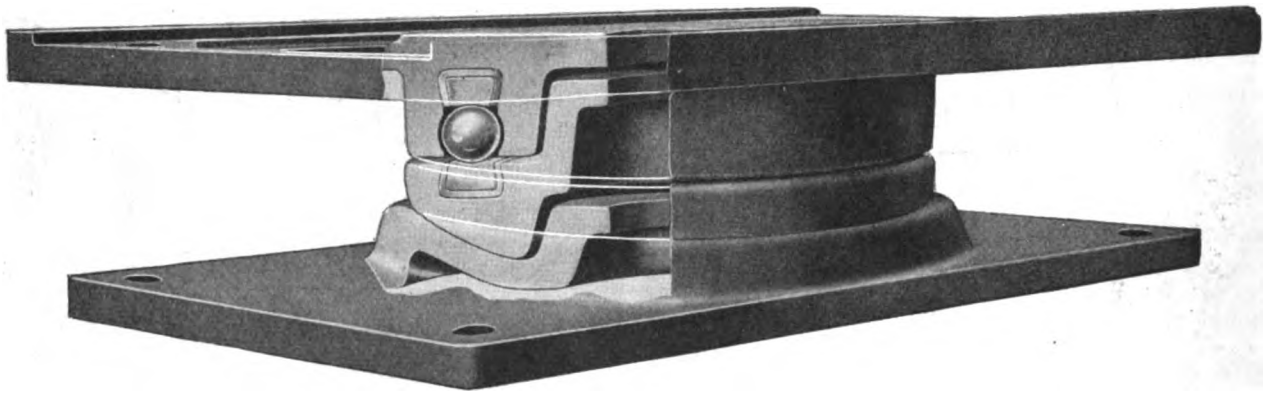
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Necessary on Modern Cars

CAR weights of 90,000 lbs. and over emphasize the importance of the truck center plate.

Wheel flanges with this heavy equipment should be relieved of unnecessary resistance of the center plate in turning of trucks. The flanges have enough to do to take care of the inertia of the car in turning.

Turning resistance is properly reduced by the Symington Ball Bearing Equalizing Center Plates. Symington Center Plates employ ball

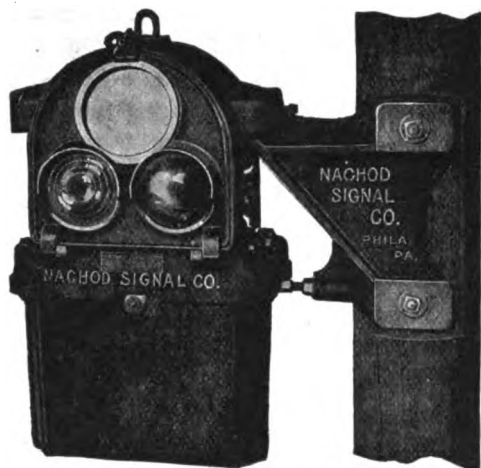
bearings to minimize turning resistance and insure their proper functioning by use of an equalizing member.

Free to move in a limited arc this equalizing member compensates for tilting of the bolsters in any direction and gives each ball its proportion of full load.

This results in the use of less power at curves, less wear of flanges and of rails, less danger of derailment. It also insures immediate straightening of the trucks entering tangent track.

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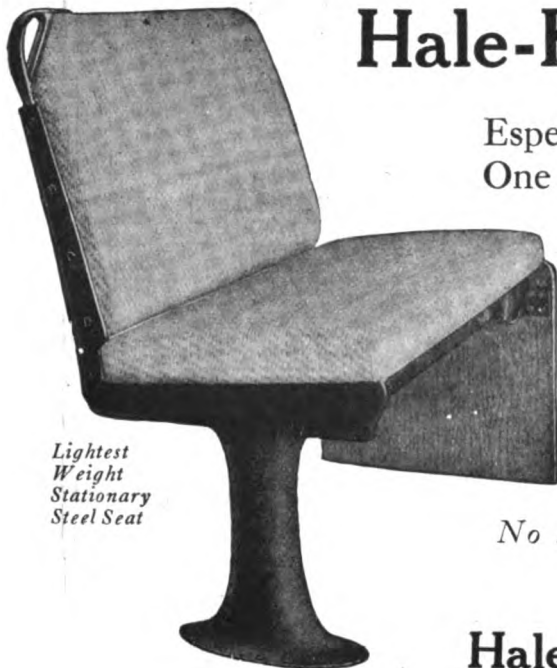
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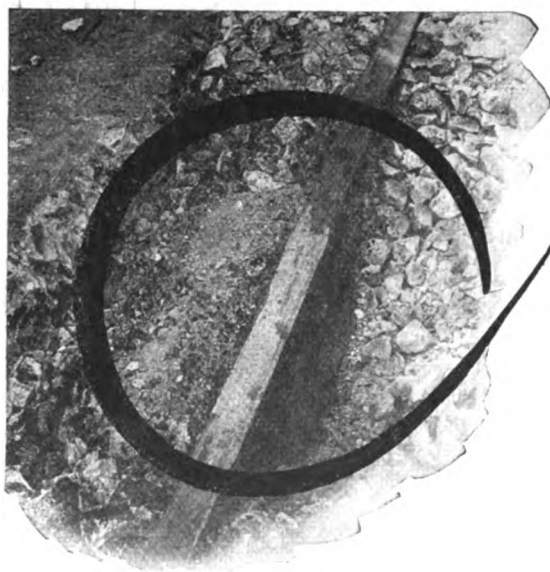
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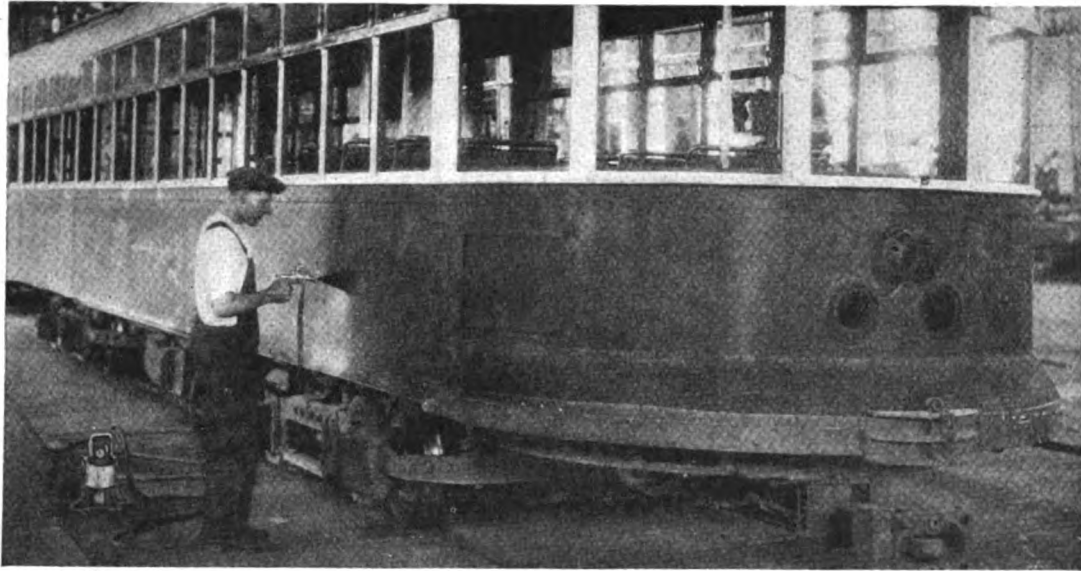


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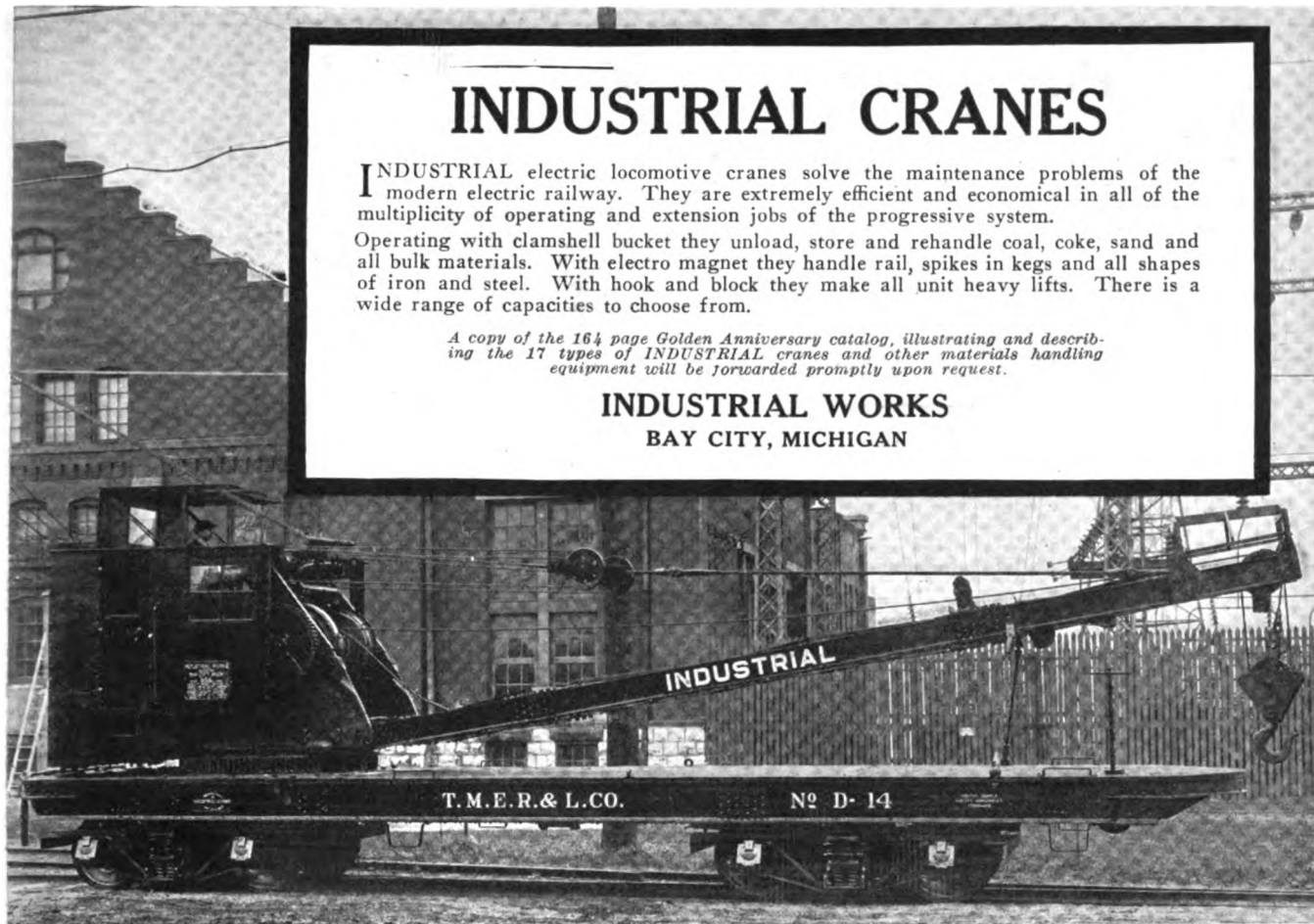
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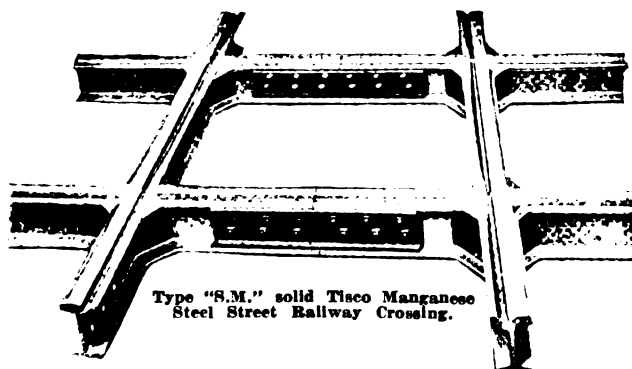
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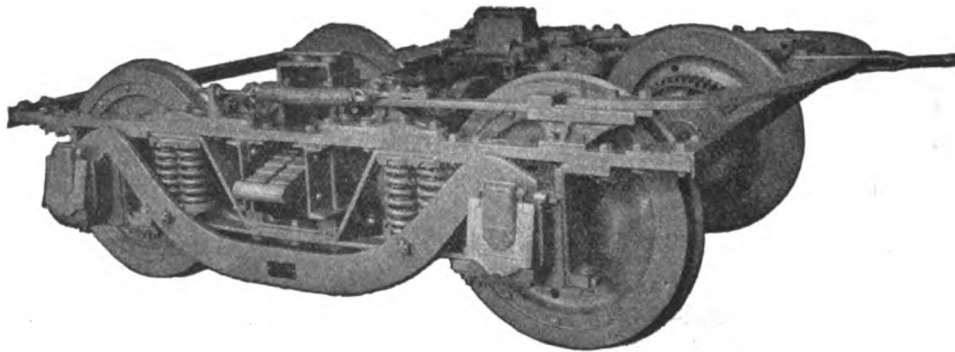
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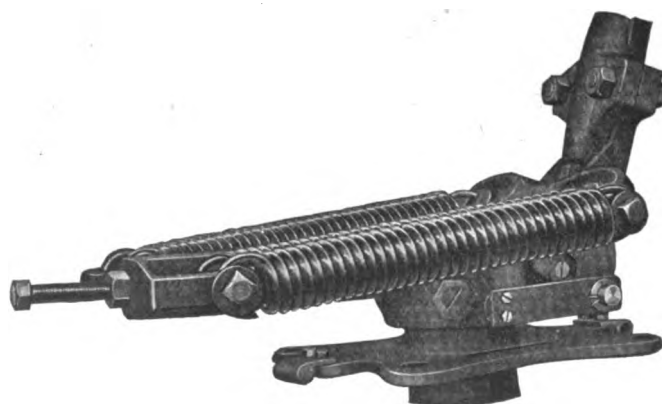
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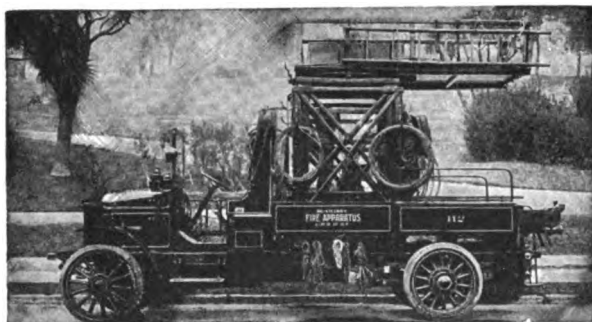
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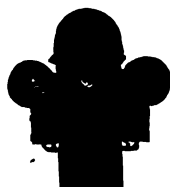
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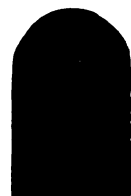
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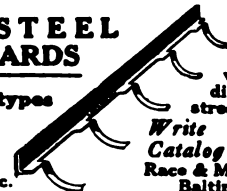
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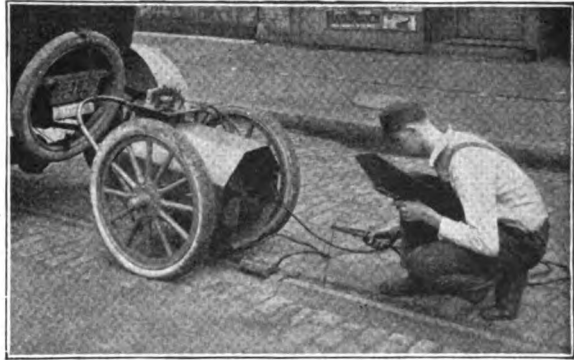
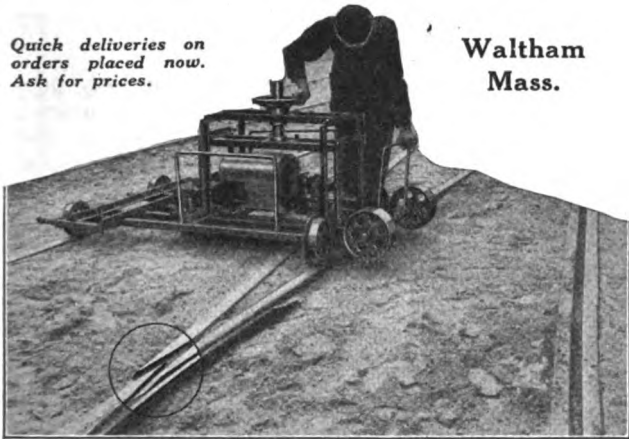
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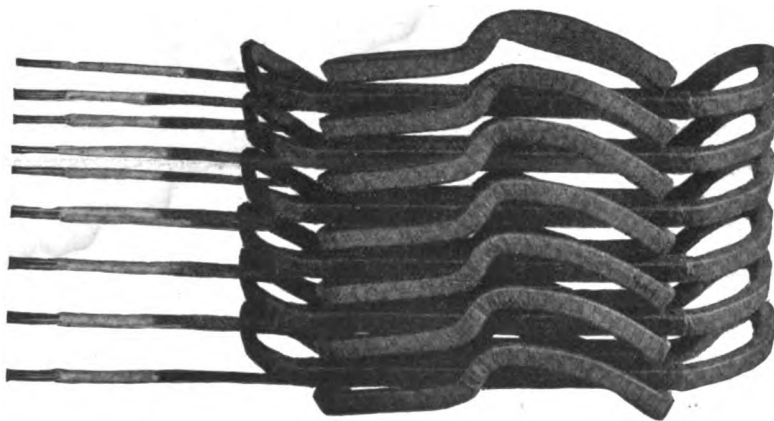
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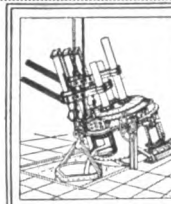
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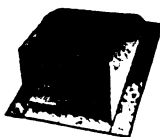


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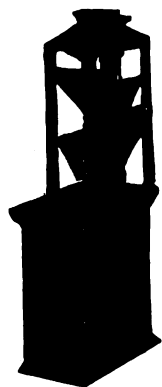
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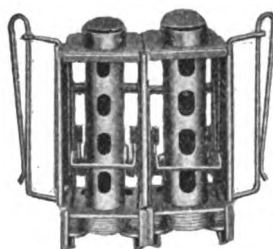
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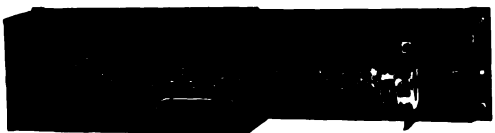
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**WHEELS
AXLES
RAILS
CROSS TIES**



Carnegie Steel Company
PITTSBURGH, PENNA.

VELOX
WHY NOT
TRY
A GILBERT & SONS B.F. CO.
ST. LOUIS, MO.
U.S.A.
BRONZE



The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.



The Differential Steel Car Co.
Findlay, Ohio

SHOCKS
have little effect on
**AJAX
CHECK PLATES**
because
these plates are made from
Ajax Perfecto Bronze



The strongest and toughest metal on the market. They will bend before they will break and give longest possible service.

The Ajax Metal Company
Established 1880
Philadelphia, Pa.

NEW YORK CHICAGO BOSTON CLEVELAND

Waterproofed Trolley Cord

SILVER LAKE A

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

**FOR POSITIVE SATISFACTION ORDER
SILVER LAKE**

If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY**.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts

SAFETY TREADS

Universal Safety Tread Company
Offices in all Principal Cities

40 Court Street Send for Catalogue E.E. Boston, Mass

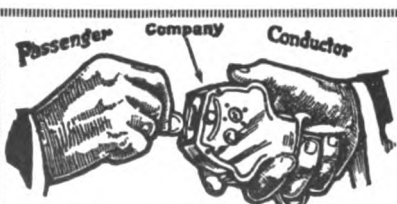
100 New Users in the Last Nine Months
KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago

CHILLINGWORTH
One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. Write Us.



Chillingworth Mfg. Co.
Jersey City, N. J.

Direct Automatic Registration
By the
Passengers
Rooke Automatic Register Co.
Providence, R. I.



The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

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Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.
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An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.R.J.

POSITIONS VACANT

SALES engineer wanted, familiar with steam and street railway special track work, capable of securing field data for the manufacture of same. Must have had experience with manufacturer of special track work. State experience, approximate salary, age and education. P-643, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

ACTIVE young man with twelve years' experience desires place with growing electric railway. Ability proved both as head of schedule department and as director of publicity. Excellent references. PW-641, Electric Railway Journal, 10th Ave. at 36th St., New York.

CAN you place a technical graduate on your staff in charge of equipment, distribution, traffic and transportation, or as divisional executive? Am 37 years of age, nicely connected with non-operating company but wish to get into actual operation. Have had operation, manufacturing and installation of railway and power. Up for your consideration. PW-636, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

CAR painter wants a position. Is a first-class all around man. Can give recommendations to that effect is desired. PW-639 Elec. Railway Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT of transportation, at present with large property, solicits correspondence with managers that are in the field for a superintendent of wide experience. Capable progressive and recognized as an economical painstaking official. High-grade references. Personal reasons for desiring a change. PW-618, Electric Railway Journal, Leader-News Building, Cleveland, Ohio.

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ELECTRIC LOCOMOTIVE

FOR SALE

Standard G. E. 50-ton Locomotive, in first class condition. Locomotive may be seen in daily operation.

ALBANY SOUTHERN R. R. CO.
Rensselaer, N. Y.

"Searchlight"
is

**Quick Action
Advertising**

0233

Brooklyn-Manhattan Transit Corporation

85 Clinton Street, Brooklyn, N. Y.

PURCHASING DEPARTMENT

FOR SALE

CAR BODIES

*Open and closed car bodies mounted
on single trucks*

CARBIC LIGHTS

(Absolutely New)

Just a Few Left at Sacrifice Prices
For Quick Disposal

No. 2 Carbic Lights \$25.00
No. 8 Milburn Lights..... 25.00
Hippodrome Milburn 30.00

Orders filled promptly while they last.

Send for our "Bargain Price Circular"
Listing Hardware, Valves & Fittings, Tools,
Pressure, Gauges, etc.

JONES-McKEE, Inc.
596 Broadway, New York, N. Y.

FOR SALE

ELECTRIC LOCOMOTIVE

26-ton Baldwin Westinghouse, all steel, fully equipped, first-class condition, double and single-truck modern light-weight steel cars.

G. T. ABEL,
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2—Unused General Electric, type 210-H,
50% of market price.

GEORGE SACHSENMAIER CO.
926 N. Third St., Philadelphia, Pa.

FOR SALE

50—G. E. No. 80-A Motors.
50—Controllers, K-28-B; K-12.
35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

RELAYING RAILS

80 and 90 lb.

Full complement of Angle Bars. Shipment January and February, 1924.

Standard Rail & Steel Co.
905 Planters Bldg., St. Louis, Mo.
Phone Olive 3654

FOR SALE

TRUCKS

12 Sets Brill 39-E. Practically new.

TRANSIT EQUIPMENT CO.
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3000 TONS 70 LB. ASCE

First Class

RELAYING RAILS

With angle Bars
Also other Weights. Immediate shipment.

ZELNICKER in ST. LOUIS

Cars, Locomotives, Piling, Tanks, etc.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

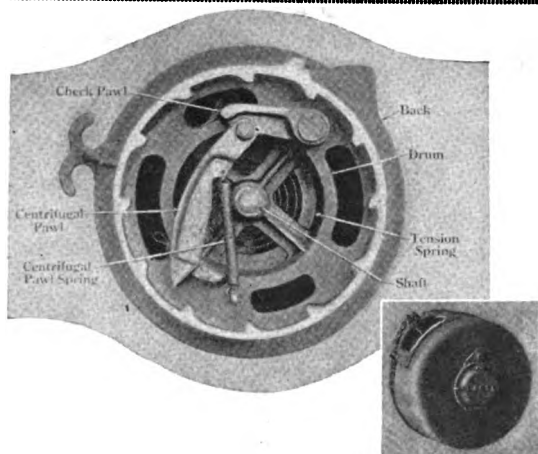
Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Drew Elec. & Mfg. Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch
Stands
Ramapo Ajax Corp.
Automatic Safety Switch
Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
St. Louis Car Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Westinghouse E. & M. Co.
Axles, Steel
Carnegie Steel Co.
Babbitt Metal
Ajax Metal Co.
Badges and Buttons
Elec. Service Supplies Co.
Int. Register Co., The
Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Drew Elec. & Mfg. Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.
Bearings, Center and Roller
Side
Baldwin Locomotive Wks.
Stucki Co. A.
Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heat's Co.
Elec. Service Supplies Co.
St. Louis Car Co.
Western Electric Co.
Belts
Babcock & Wilcox Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Western Electric Co.
Bonds, Rail
Amer. Steel & Wire Co.
Drew Elec. & Mfg. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Track-work Co.
Western Electric Co.
Westinghouse E. & M. Co.
Book Publishers
McGraw-Hill Book Co.
Brackets and Cross Arms
(See also Poles, Ties,
Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss
Co.
Drew Elec. & Mfg. Co.
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Western Electric Co.
Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Brakes, Brake Systems and
Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Brooms, Track, Steel and
Rattan
Amer. Rattan & Reed Mfr.
Co.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.
Brushes, Wire, Pneumatic
Ingersoll-Rand Co.

Brush Holders
Anderson Mfg. Co., A. &
J. M.
Bunkers, Coal
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bus Seats
Hale-Kilburn Co.
Heywood-Wakefield Co.
Bushings, Case Hardened and
Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Cables (See Wires and
Cables)
Cambrie Tapes, yellow and
black varnished
Mica Insulator Co.
Carbon Brushes (See Brushes,
Carbon)
Car Panel Safety Switches
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.
Car Lighting Fixtures
Elec. Service Supplies Co.
Car Panel Safety Switches
Consolidated Car Heat's Co.
Cars, Passenger, Freight, Ex-
press, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Watson Mfg. Co.
Cars, Gas, Rail
St. Louis Car Co.
Ribany Southern Railroad
Co.
Jones-McKee, Inc.
Cars, Self-Propelled
General Electric Co.
Car Signal System
Fahnestock Elect. Co.
Castings, Brass, Composition
or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. &
J. M.
Drew Elec. & Mfg. Co.
Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
St. Louis Car Co.
Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
St. Louis Car Co.
Catchers and Retrievers,
Trolley
Earl, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
Caterpillar Conveyors
Archbold-Brady Co.
Western Electric Co.
Change Carriers
Cleveland Fare Box Co.
Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.
Clamps and Connectors for
Wires and Cables
Anderson Mfg. Co., A. &
J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Scrapers, Track
(See also Snow-Plows,
Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.
Cloth, Stencil Silk Sign
Kress & Co.
Clusters and Sockets
General Electric Co.
Coal and Ash Handling (See
Conveying and Hoisting
Machinery)
Cold Banding and Winding
Machines
Elec. Service Supplies Co.
Colls, Armature and Field
Economy Elec. Devices Co.
Elliot-Thompson Elec. Co.
General Electric Co.
Westinghouse E. & M. Co.
Colls, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.
Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Cleveland Armature Works
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.
Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Western Electric Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
Ingersoll-Rand Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Connectors, Solderless
Westinghouse E. & M. Co.
Connectors, Trailer Car
Consolidated Car Heat's Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Controllers or Parts
General Electric Co.
Westinghouse E. & M. Co.
Controller Regulators
Elec. Service Supplies Co.
Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
Conveying and Hoisting Ma-
chinery
Columbia M. W. & M. I. Co.
Copper Wire
Anaconda Copper Mining Co.
Page Steel & Wire Co.
Cord, Bell, Trolley, Register,
Brill Co., The J. G.
Elec. Service Supplies Co.
Internatl Register Co., The
Roebing's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Silver Lake Co.
Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Allis-Chalmers Mfg. Co.
Industrial Works
Universal Crane Co.
Cranes, Gas or Electric
Industrial Works
Universal Crane Co.
Cranes, Locomotive, Motor
Truck & Portable
Industrial Works
Universal Crane Co.
Cross Arms (See Brackets)
Crossing Foundations
International Steel Tie Co.
Crossing
Ramapo Ajax Corp.
Crossing Signals (See Sig-
nals, Crossing)
Crossing, Frog & Switch
Wharton, Jr. & Co., Wm.
Ramapo Ajax Corp.
Crossing Manganese
Ramapo Ajax Corp.
Crossings, Track (See Track,
Special Work)
Crossings, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
Curtains and Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.
Dealer's Machinery
Elec. Equipment Co.
Edlyn-Manhattan Transit
Corp.
Transit Equip. Co.
Zelnick Supply Co., W. A.
Derailing Devices (See also
Track Work)
Wharton, Jr. & Co., Wm.
Derailing Switches, Tee Rail
Ramapo Ajax Corp.
Detective Service
Wish-Service, P. Edward
Doors & Door Fixtures
Hale-Kilburn Co.
St. Louis Car Co.

Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heat's Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Band
Elec. Service Supplies Co.
Ears
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
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Amer. Electrical Works
Roebing's Sons & Co., J. A.
Western Electric Co.
Electric Grinders
Railway Track-work Co.
Rail Welding & Bonding Co.
Seymour Rail Grinder Co.
Electrodes, Carbon
Railway Track-work Co.
Electrodes, Steel
Railway Track-work Co.
Engineers, Consulting, Con-
tracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layne Corp.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Richey, Albert S.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.
Worham, Edwin
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Fence Posts
Amer. Steel & Wire Co.
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Consolidated Car Fender Co.
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St. Louis Car Co.
Star Brass Works
Fibre and Fibre Taping
Westinghouse E. & M. Co.
Field Colls (See Colls)
Flangeway Guards, Steel
Godwin Co., Inc., W. S.
Fluximum Insulation
Nat'l Ry. Appliance Co.
Floodlights
Elec. Service Supplies Co.
Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.
Frogs, Track (See Track
Work)
Frogs, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
Funnel Castings
Wharton, Jr., Inc., & Co.
Wm.
Furnace, Electric
Pittsburgh Elec. Furnace
Corp.
Furniture, Metal Office
Edwards Co., Inc., O. M.
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General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
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General Electric Co.
Gaskets
Flower Specialty Co.
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General Electric Co.
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Westinghouse E. & M. Co.
Gates, Car
Brill Co., The J. G.
St. Louis Car Co.
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Chillingworth Mfr. Co.
Elec. Service Supplies Co.
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Bemis Car Truck Co.
Elec. Service Supplies Co.
General Electric Co.
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Nuttall Co., E. D.
Tool Steel Gear & Pinion
Co.
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General Electric Co.
Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
Girders, Rail
Lorain Steel Co.
Gong (See Bells and Gongs)
Grinders and Grind. Supplies
Metal & Thermit Corp.
Railway Track-work Co.
Grinders, Portable
Buda Company
Railway Track-work Co.
Grinders, Portable Electric
Railway Track-work Co.
Seymour Rail Grinder Co.
Grinding Bells and Wheels
Railway Track-work Co.
Ground Wires
Page Steel & Wire Co.
Guard Rail Clamps
Ramapo Ajax Corp.
Guard Rails, Tee Rail &
Manganese
Ramapo Ajax Corp.
Guards, Cattle
American Bridge Co.
Guards, Trolley
Elec. Service Sup. Co.
Ohio Brass Co.
Hammers, Pneumatic
Ingersoll-Rand Co.
Horns, Trolley
Anderson Mfg. Co., A. &
J. M.
Elec. Service Supplies Co.
Nuttall Co., E. D.
Star Brass Works
Thornton Trolley Wheel Co.
Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Heaters, Car (Electric)
Consolidated Car Heat's Co.
Economy Elec. Devices Co.
Gold Car Heat. & Light. Co.
Nat'l Ry. Appliance Co., P.
Smith Heater Co., Peter
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Water
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Ingersoll-Rand Co.
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Allis-Chalmers Mfg. Co.
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ing and Recording
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Mica Insulator Co.
Mitchell-Rand Mfr. Co.
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Anderson, M. Co., A. &
J. M.
Electric Ry. Equipment Co.
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Mitchell-Rand Mfg. Co.
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Material)
Anderson, M. Co., A. &
J. M.
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Westinghouse E. & M. Co.
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All new catchers are good—

But when they wear so that the pole is checked too late, they're junk. The short fat check pawl of

Earll Catchers and Retrievers

engages full face-on. No points or edges to wear or batter. Even aged Earlls check the pole as promptly as when new. Throughout an almost endless life they always operate promptly—another one of the five exclusive Earll Catcher and Retriever Features.

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B. J. Earll, York, Pa.

Canadian Agents:
Railway & Power Engineering Corp., Ltd., Toronto, Ont.
In All Other Foreign Countries:
International General Electric Co., Schenectady, N. Y.

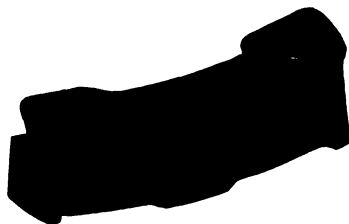
Brake Shoes A.E.R.A. Standards

Diamond "S" Steel Back is the Best Type



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Patterns
for

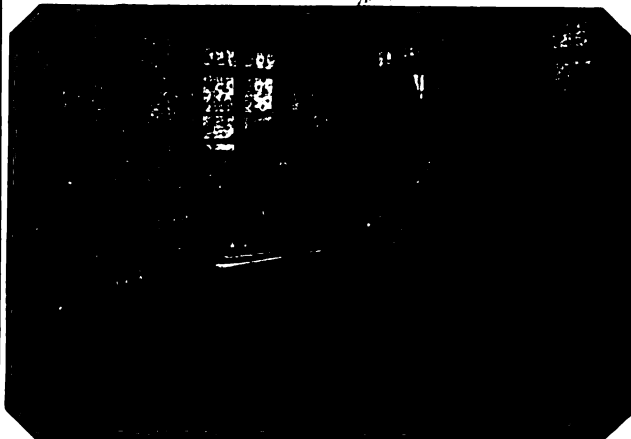
**SAFETY
CAR**



D-67 for Narrow Treads
D-87 for Wide Treads

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago Chattanooga, Tenn.

A Reliable Air Supply for Shop, Switch or Signal Service



There's something built into a Class "ER" compressor which makes this smaller type stand out as superior in the test of constant, reliable service. That something is *quality*.

An Ingersoll-Rand Class "ER" unit gives to the user of a small volume of air a supply which he can always depend upon. Also, efficient design minimizes the power requirement and automatic lubrication and valve action keep down need of attendance.

When driven by an electric motor with short belt drive this machine can be equipped with an improved automatic start and stop control—an ideal control for switch and signal service.

Bulletin No. 3430

INGERSOLL-RAND COMPANY

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Butte	Duluth	New Orleans	Seattle
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Cleveland	Houghton	Pittsburgh	Washington, D. C.

For Canada, refer to Canadian Ingersoll-Rand Co., Limited
260 St. James Street, Montreal

Ingersoll-Rand

706-C

- Insulators, High Voltage**
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Jacks (See also Cranes, Hoists and Lifts)
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(See Rail Joints)
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Symington Co., The T. H.
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Anderson Mfg. Co., A. & J. M.
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Lamps, Arc and Incandescent (See also Headlights)
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Westinghouse E. & M. Co.
Lamps, Signal and Marker
Nichols-Lintern Co.
Lanterns, Classification
Nichols-Lintern Co.
Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.
Line Material (See also Brackets, Insulators, Wires, etc.)
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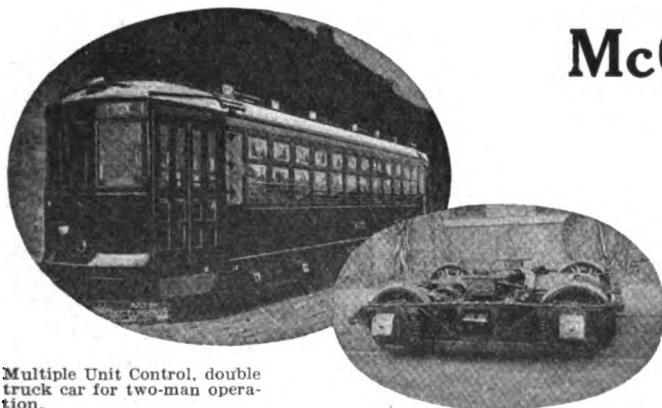
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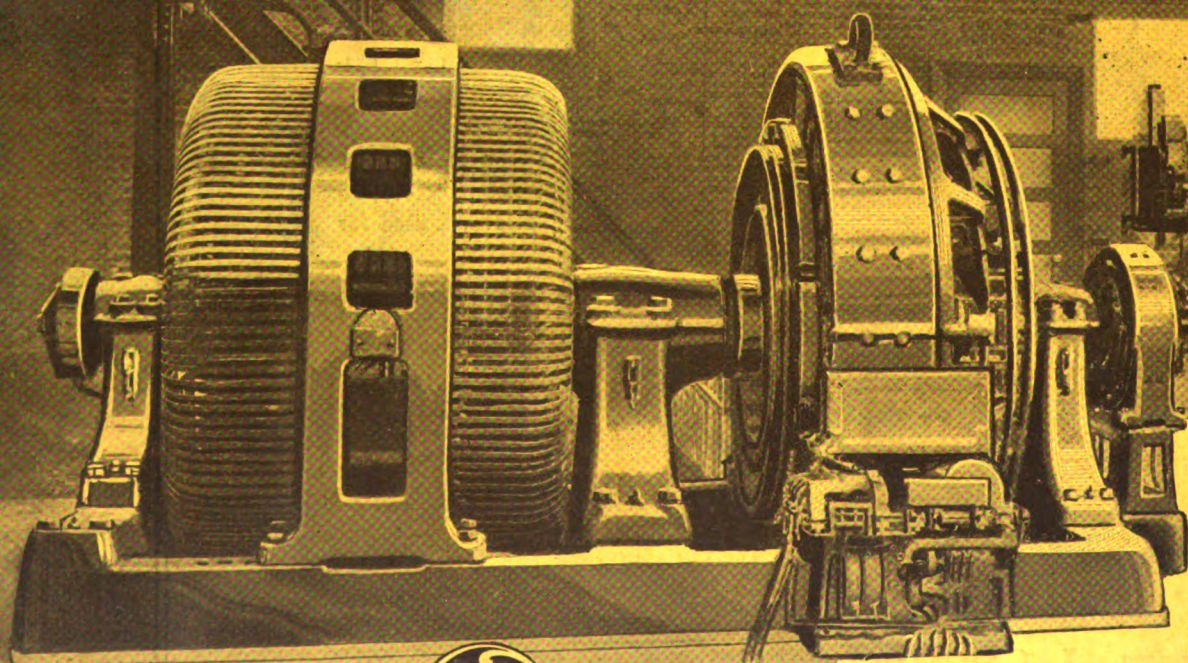


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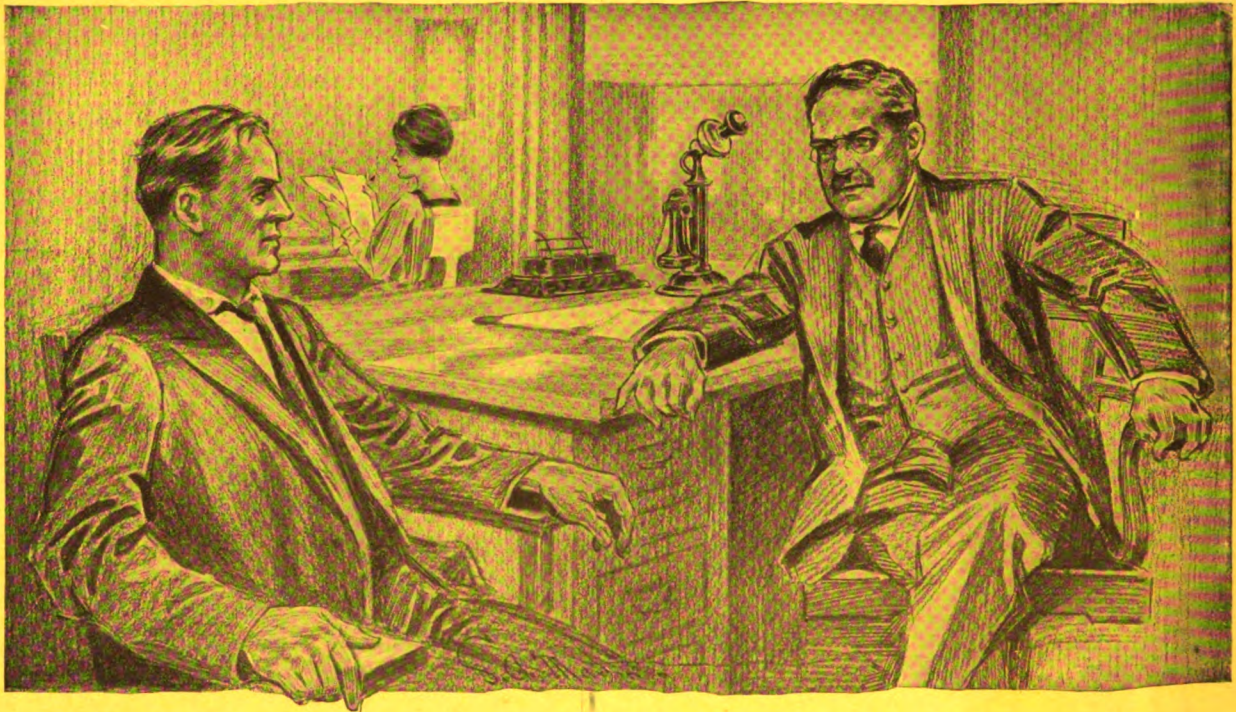
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PEOPLES GAS BLDG., CHICAGO 11 B'WAY, N. Y. MONADNOCK BLDG., SAN FRANCISCO



According To Predictions

"Joe," remarked the Vice President, "I am very much impressed with the large number of new cars and equipments ordered by the railroad companies in all parts of the country during the past year. My investigation indicates that the use of these new cars and equipment will effect marked economy in operation and will materially facilitate transportation of the masses."

"Boss," replied Joe, "our own plans have worked out to perfection. As a result of the foresight of our Transportation Engineer, a year ago, we have *sold* transportation and built up our system to take care of the transportation that we have sold."

"Much of the credit is due to Westinghouse Multiple-Unit HL Control, which permits us to haul almost twice the passengers over the same route with two car trains, as was possible before with single units."



Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.



Westinghouse

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

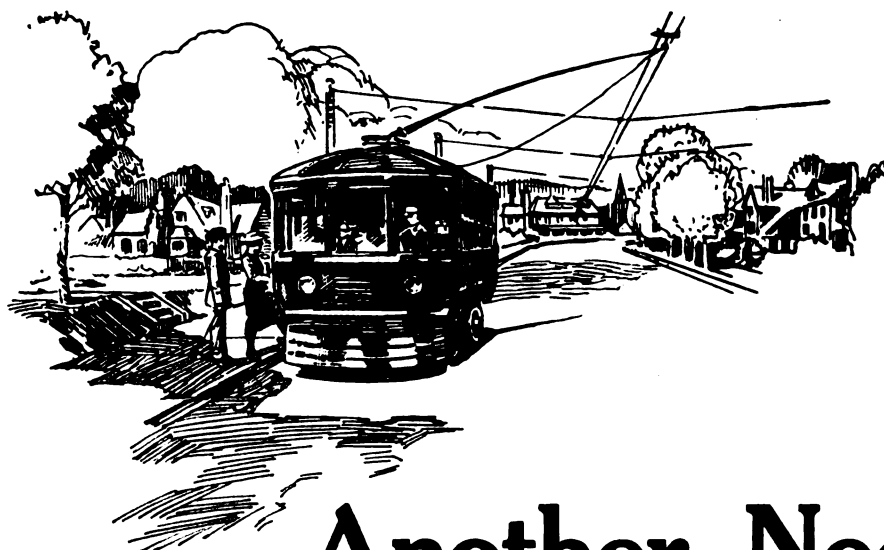
When One Minute Means 100 Hours

A RATHER extensive acquaintance with electric railway men leads to the conclusion that they are about the busiest mortals on this rotating sphere of ours. That thought is kept always in mind in the preparation of matter for publication in ELECTRIC RAILWAY JOURNAL.

We believe our readers want to get to the point of the story quickly, read all that is of real importance, and then stop. They do not want to read a whole page to find out what can be fully told in half a column. They do not want to read the thousand words the average man says or writes in getting into his subject. It isn't so bad when you hear the preliminaries spoken, but to read them is boring and may divert one from reading an otherwise good paper.

Although everyone may not realize it, to condense each story to the fewest possible words, and to eliminate those things which are not essential while preserving a proper understanding, requires a great deal of work. Sometimes the author of an article, or a reader to whom it appeals especially, may feel that this process has been carried too far, and that not all of the information he would have liked to see printed is in the published story. That, of course, is a possibility, but in general, it will be found that very little that is new or constructive and worthy of space is cut out.

The editors spend their time to save your time. They can afford to do this, for one minute saved on the time required to read the real meat of any paper or article means a total saving of 100 hours for the 6,000 readers.



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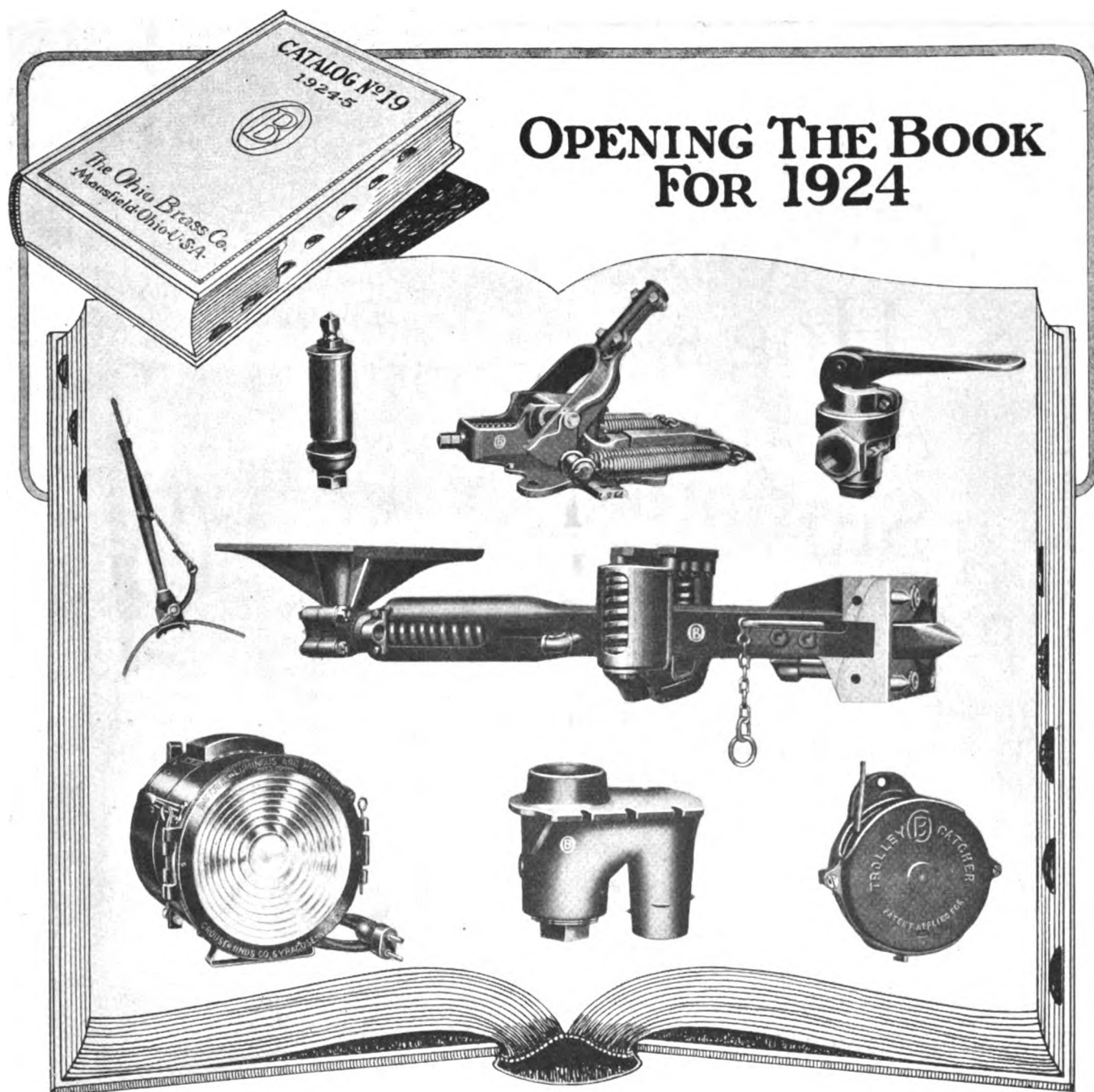
The equipment is light and simple in design, but rugged, and provides all the essential features of the standard Westinghouse Traction Brake.

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The Ground Hog's Annual Survey

IT'S DUE next week—February 2nd, to be exact. He cocks his weather eye aloft (says the legend) then looks for his shadow. Six weeks of cold is the most that's in store for us then. Six weeks go quickly. Will you be ready for the track renovation? Grinders enough? Ample Abrasives? Good arc welders?

We have them for you. Quick action on early orders. Avoid the rush.

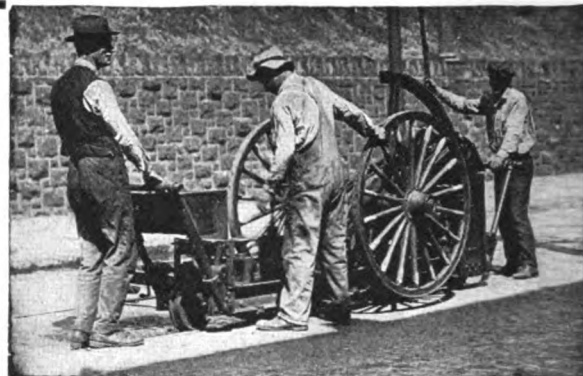
*All the facts are in our bulletins
—yours for a word. Better have
them while there's still time to
read.*

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

AGENTS

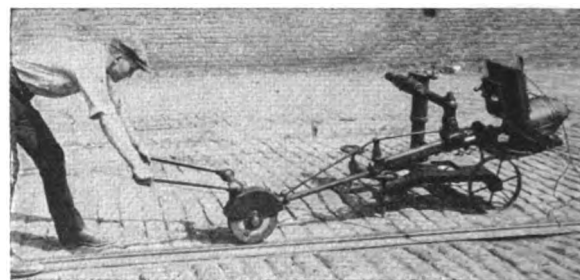
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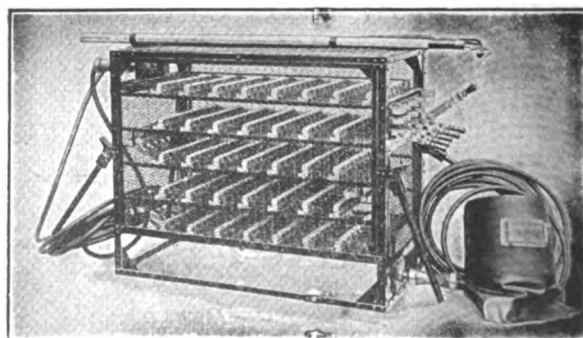
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"Hercules" Ball Grinder



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"Ajax" Electric Arc Welder

Steel Twin Tie Track

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Permanent Base
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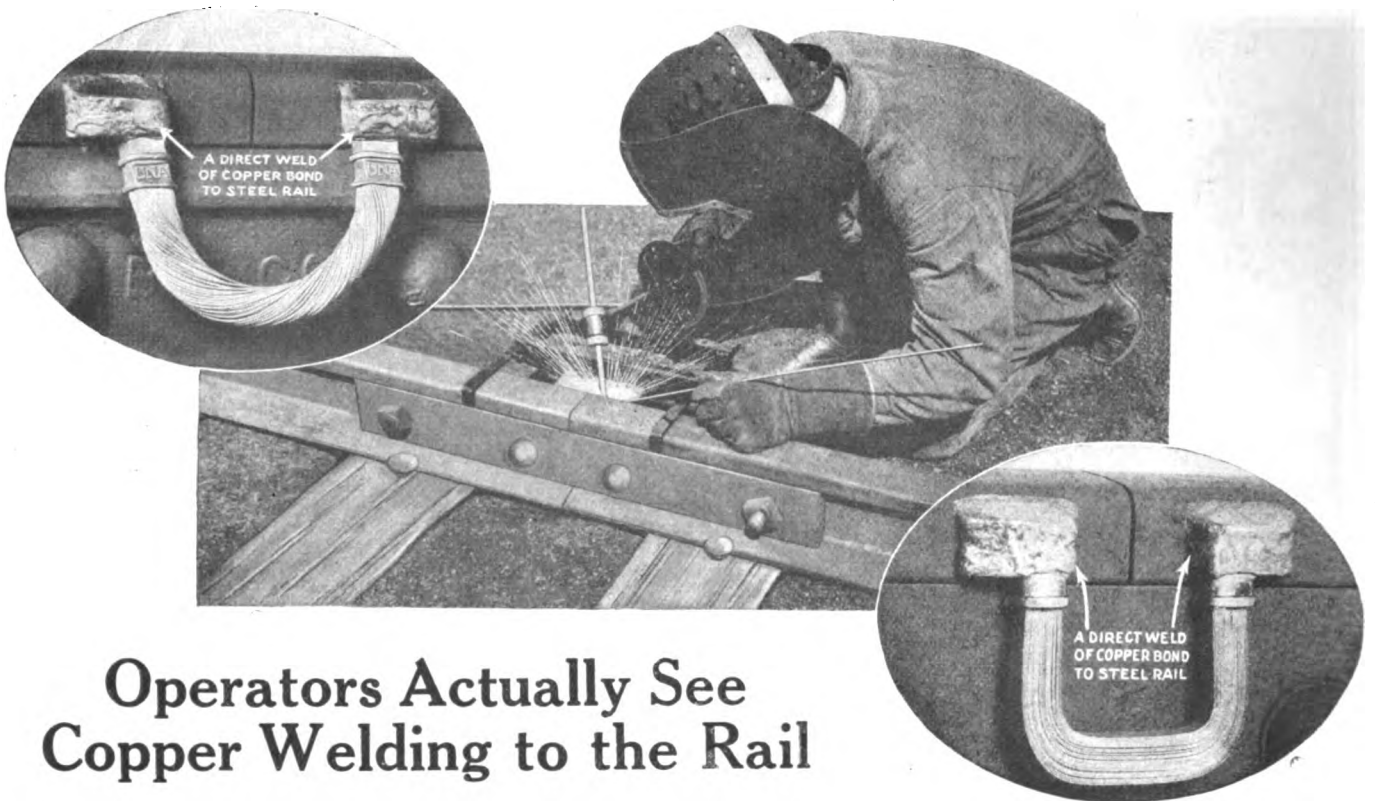
in Steel Tie Construction warrants the investigation and consideration of this design for all your 1924 Paved Work.

But the other reasons for using this economical permanent, adaptable and easy riding track have lost none of their force.

All details, including an estimate on the detailed cost installed on your property, are included in our folder on Steel Tie Track Construction.

Before closing your plans for 1924 Paved Work please ask for it.

THE INTERNATIONAL STEEL TIE COMPANY
CLEVELAND, OHIO



Operators Actually See Copper Welding to the Rail

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While welding the all copper UNA Bonds direct to the rails, they can actually see the copper welding to the rail, which leaves no doubt about the soundness of the welds. By this gauge of workmanship every bond can be applied with a definite knowledge that it is properly welded.

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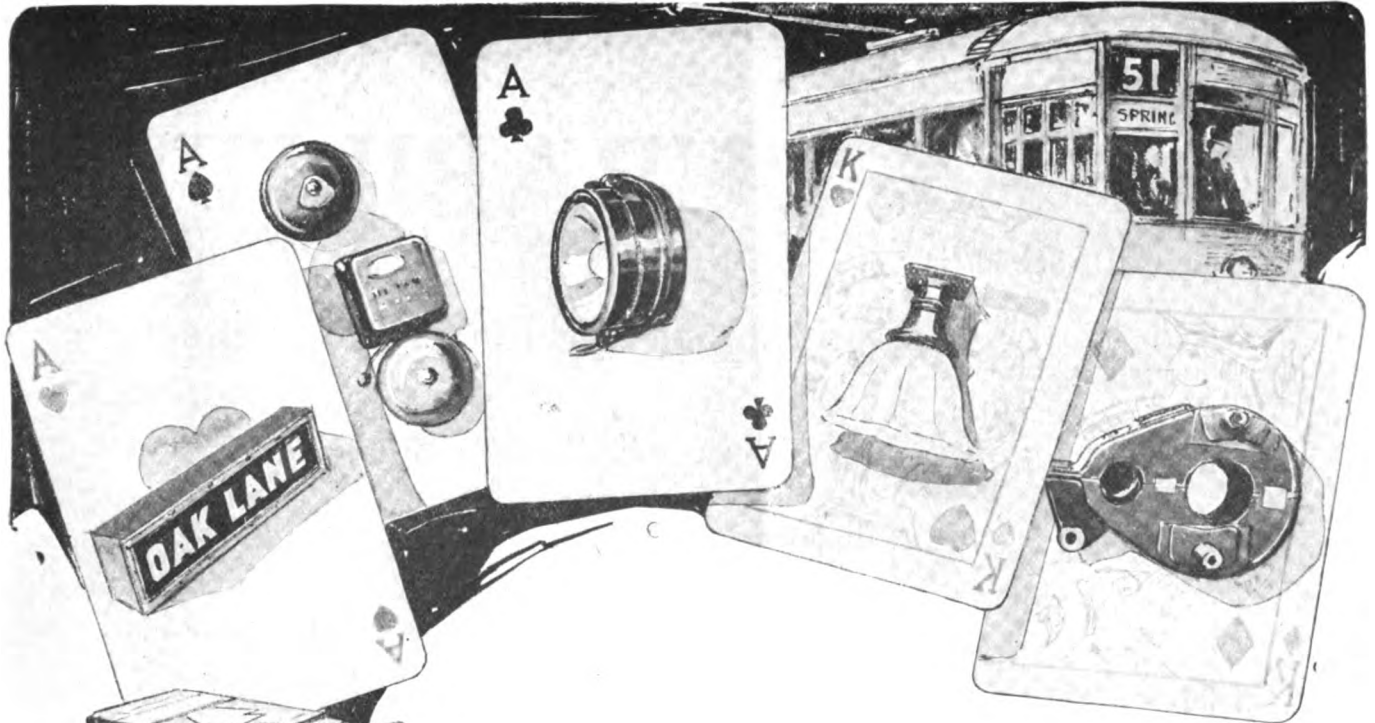
With UNA Bonds excellent electrical conductivity is secured for the all copper bonds are welded direct to the rails. This provides a free path of copper for the current from rail to rail.

For reliable bonding use UNA Rail Bonds.
Full information on request.

UNA Rail Bonds

Rail Welding & Bonding Company, Cleveland, Ohio

UNA Joints



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Look over the Keystone deck at the left and pick your own winners.

Comprehensive up-to-the-minute data sheets on any or all of these items will be sent gladly on request.



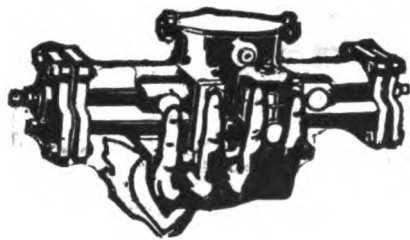
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**No packing glands to be main-
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MOTORMAN'S
SIGNAL LIGHTS

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National Pneumatic Company, Inc.

Originators and Manufacturers

PRINCIPAL OFFICE: 50 Church St., NEW YORK

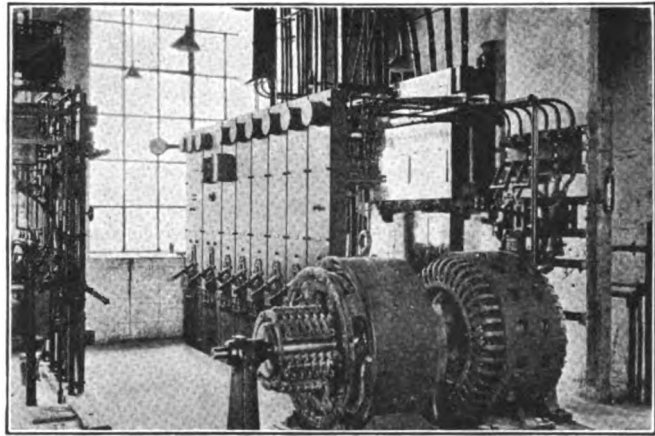
Philadelphia—Colonial Trust Building Chicago—McCormick Building

Works—Rahway, New Jersey

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Are you ready for fire



Here?

as well as

Here?

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Tells how the FOAMITE method gives your plant real security against fire. Also describes other methods. Write for your copy.

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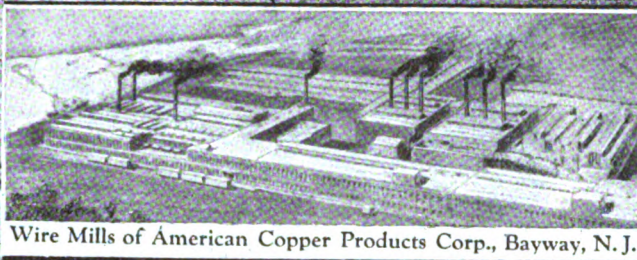
Fire Protection Engineers and Manufacturers

127 Turner Street, Utica, N. Y.

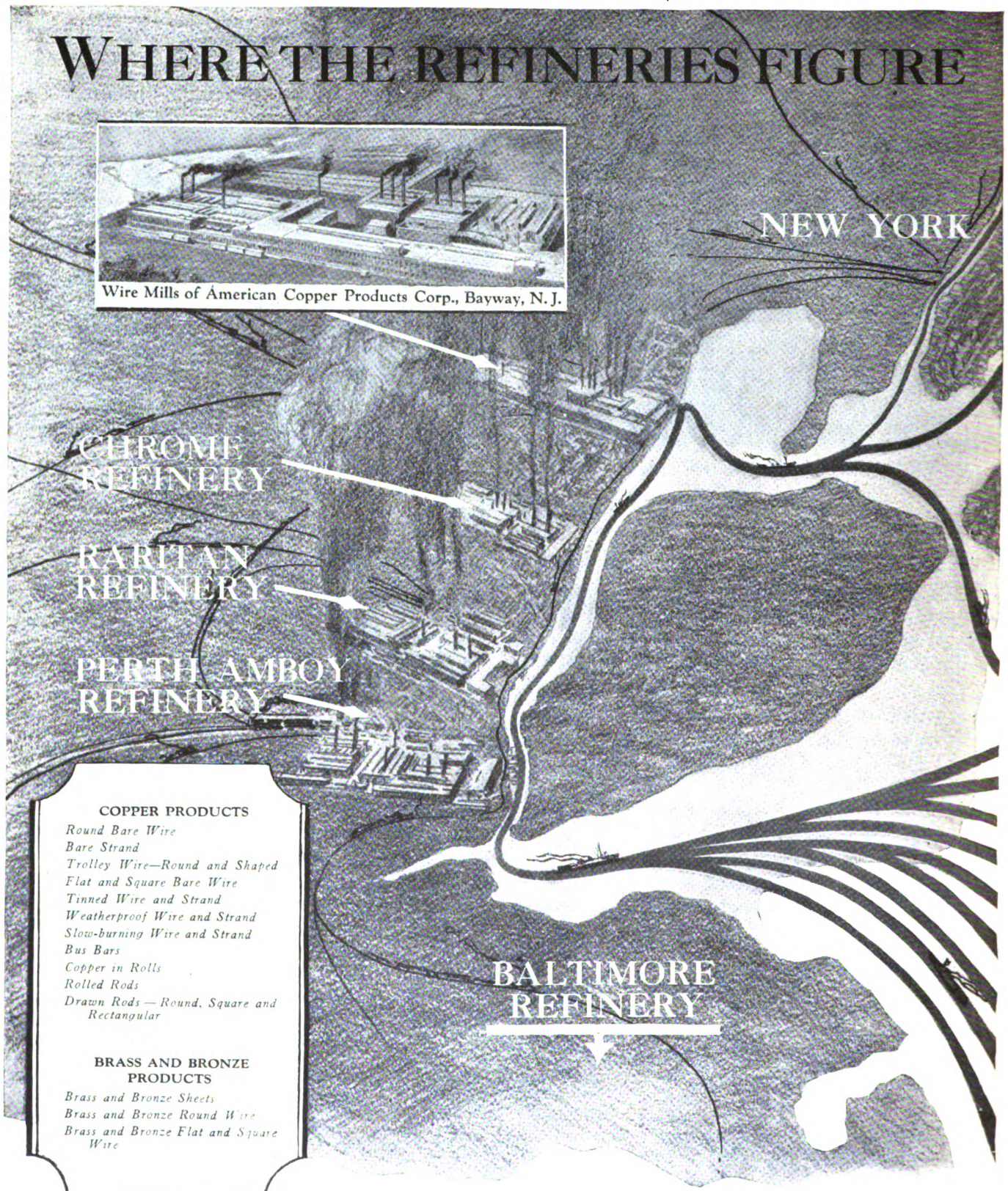
Foamite-Childs of Canada, Ltd., Toronto, Ont.

Sales and Engineering Representatives in the leading cities of all countries

WHERE THE REFINERIES FIGURE



Wire Mills of American Copper Products Corp., Bayway, N. J.



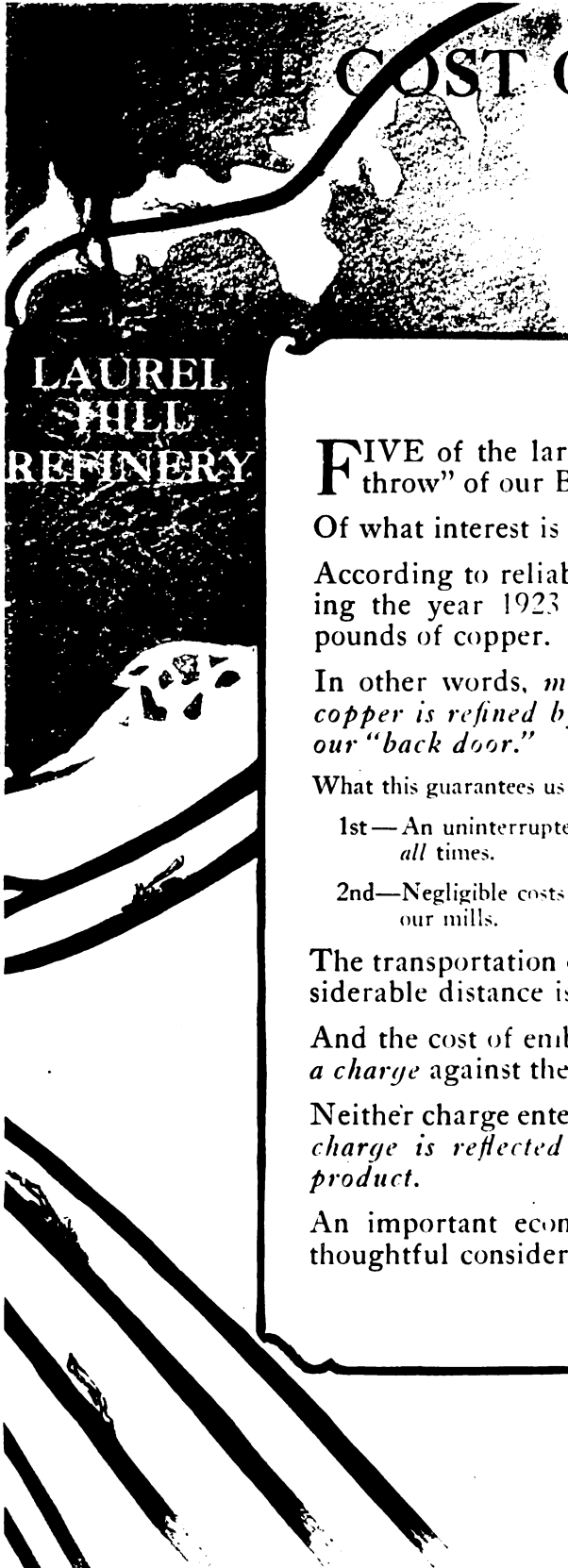
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REFINERY

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AMERICAN COPPER PRODUCTS
CORPORATION
233 BROADWAY NEW YORK

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August, 1923, Edition

with **NEW FEATURES**

New data regarding number of buses owned.

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New listing of holding companies (cross indexed).

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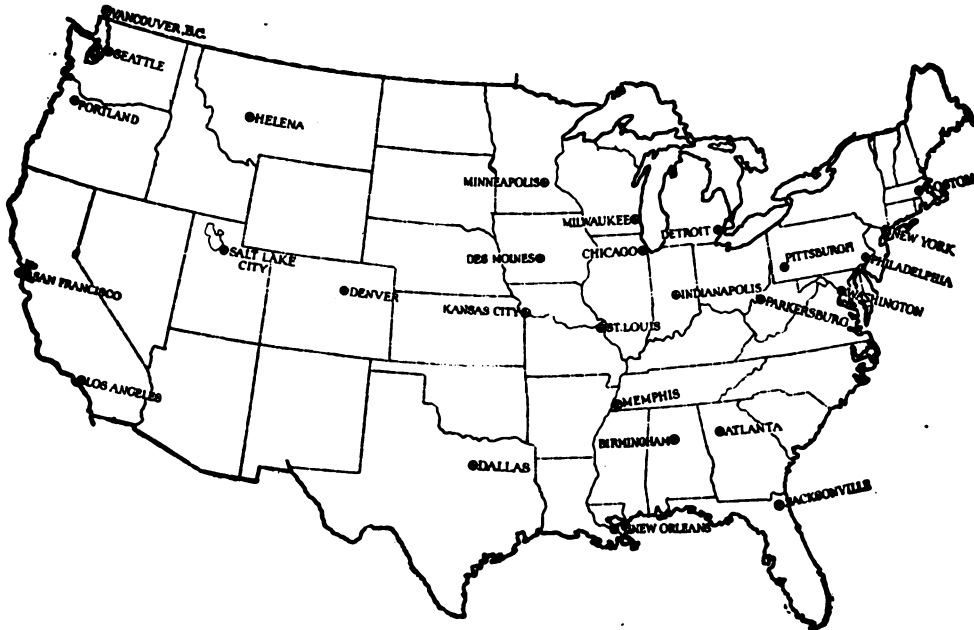
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| 2. Address of each company. | 10. If water power is used, horsepower and make of prime movers. | 21. Number and kind of rolling stock used. |
| 3. Names of affiliated and controlling corporations. | 11. If steam power is used, horsepower and make of boilers and engines. | *22. Number of one-man cars. |
| 4. Names of principal communities on routes. | 12. If gas or oil engines are used, horsepower and make. | *23. Rate of fares. |
| 5. Names and addresses of corporation officers and principal department heads, including purchasing agents. | 13. Transmission voltage. | 24. Doing a lighting business. |
| 6. Names and addresses of holding or controlling companies and lists of properties controlled by each. | 14. Trolley voltage. | 25. Date of latest information. |
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WE DO NOT CLAIM

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BUT WE DO CLAIM

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Galena-Signal Oil Company

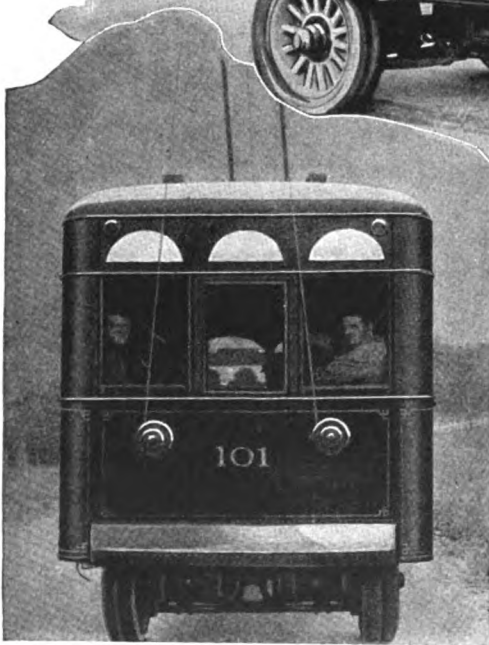
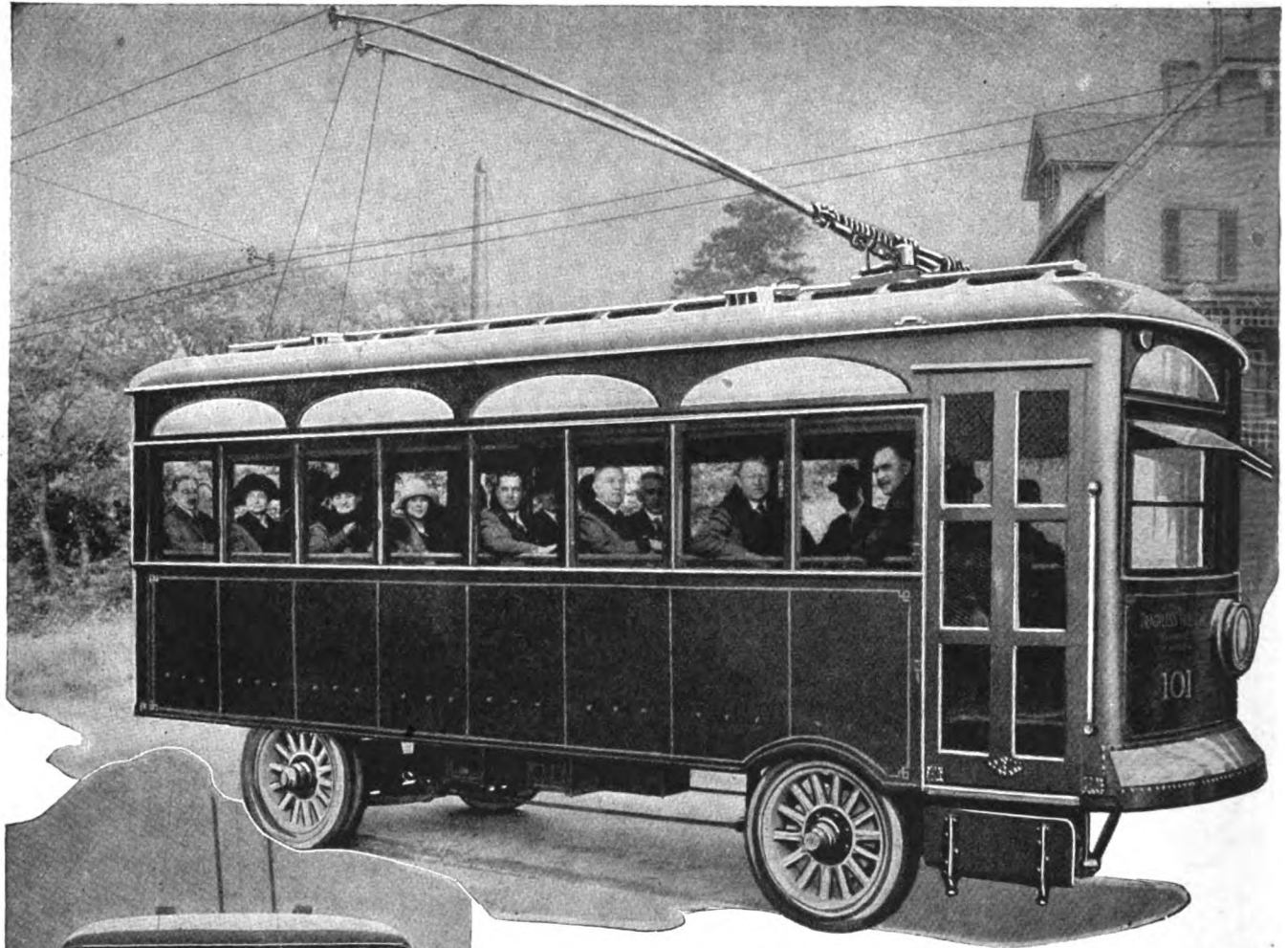
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Trackless Trolley Company four-wheel-drive trolley bus

Four Wheel Drive for Trolley Buses

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Each bus is equipped with four GE-1094—14-h.p.—Motors and with G-E standard foot-operated type M non-automatic Control. Rapid acceleration and maximum speed of 25 miles per hr. are obtained.



General Electric Company
Schenectady, N. Y.
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GENERAL ELECTRIC

New York, January 26, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 63
Number 4

Main Value of Electrification Is Increased Use of Entire Plant

GRADUALLY the ideas regarding the value of electrification for steam railroads are becoming clarified. One by one the important terminals are being converted to electric operation to eliminate the smoke nuisance and to permit underground entrances to large cities.

Electrification for main trunk lines, on the contrary, has been deferred in many cases because it has not been possible to figure a direct monetary saving as the result of the necessary investment in electric equipment. The commonly made comparison between operation of the existing service with electricity as against steam is to compute the cost of each, figuring the various items as estimated by the engineer in charge, who usually has had years of steam railroad experience but who is relatively unfamiliar with what electric traction can do.

With the improvements that have been made in steam locomotives in the past few years, the one-time large advantage of electric operation in fuel economy has ceased to be, if it ever was, a convincing argument in favor of electrification. Unfortunately, it is on this narrow basis that the decision has frequently been made not to electrify.

Looking at the problem in this way is taking a short-sighted view of a situation that is now confronting the railroads, and that will become increasingly serious as the density of traffic increases. Many of our railroads were constructed originally for much less tonnage than they are now hauling, and the demand for transportation, both freight and passenger, is fast coming to the point where it cannot all be handled. This is almost certain to come from one or both of two main causes—insufficient main line track capacity or inadequate terminals.

Track capacity is determined by the number of trains that can be handled safely over it, and this in turn is a function of the train weight and speed. Each road is almost certain to have a ruling grade, a tunnel, a stretch of single track, or other limiting section that determines the capacity of the entire system so far as through traffic is concerned. Remove this and more trains can be hauled.

The simplest way to increase the capacity is, of course, to construct additional tracks on the limiting section. Due to the very nature of the limiting section, which is determined largely by the topography, this may, however, be difficult, so that remedies must be considered that will increase the ability of the existing tracks to handle cars. No way has yet been devised to do this that can compare with electrification. Making the locomotive a transformer rather than a generator of power removes many of the limitations, both of the physical layout and the movements over it, so that the line can be used more intensively.

The electric locomotive also is particularly flexible, both as to permissible speed and ability to be coupled up in various combinations to adjust locomotive capacity for various loads. Not only can one crew handle the combination but the several units work absolutely in unison. This makes possible a large increase in the tonnage that can be hauled in one train, and in the schedule speed at which it can be moved.

The Lesson of the Virginian Electrification

THE decision to electrify the Virginian Railway, which was the outstanding event of last year in the heavy traction field, well illustrates how the capacity of the plant will be increased. Steam power had about reached the limit on the ruling division of the road. Some of the heaviest Mallet engines in the world were being double and triple headed, and even then the speed up the grade was only 7 m.p.h. for maximum trainloads of 5,500 tons.

This was very good performance under steam operation, but it was not enough. The tracks elsewhere on the system were not working to capacity on account of this division, even though the best thought of locomotive designers and operators had been concentrated on the problem of freight movement. Electrification was the logical answer, for by its application the trainloads will be increased at once to 9,000 tons, and if necessity arises in the future they can be still further augmented to 12,000 tons. Furthermore, the speed on the ruling grade will be doubled. This means that the entire system will have its capacity raised greatly.

The lesson of the Virginian can be applied in many places. Thus it is not merely to handle traffic more expeditiously over the mountain or other limiting divisions that electrification is of value. It is the ability of the electric operation to make possible an increase in the usefulness of the entire plant.

Suppose, for instance, a railroad with a total investment of \$100,000,000 has reached its maximum ability to handle traffic. If electric operation, whether for the ruling division only or for the entire system, can double the capacity of the road, the earning power of the entire investment has been increased just that much. If, for instance, the cost of electrification to do this is \$20,000,000, it will accomplish as much as the construction of a duplicate steam road for \$100,000,000.

Looking at the problem in this way, it is not a question of whether the pounds of coal burned is greater with one system than with the other, or that the maintenance per locomotive is more or less. It is the relation of electrification to the earning power of the entire system that should govern the decision.

Making the Railway a Good (Not Bad) Advertiser of the Holding Company

IT FREQUENTLY happens that there is included in a holding organization composed primarily of power companies one or more small railway properties.

Because of past performances, these railway properties are sometimes taken over with considerable misgiving at the time of the consolidation, and are treated very much as a doorstep foundling in an unwelcome household. The spirit and appearance of the orphan is quickly reflected in the attitude of the public as the result of the condition of the physical equipment with which they come in contact.

A number of progressive utility managers have appreciated the possibilities of such small railway properties as points of contact for the establishment of favorable public relations, making as they do a very much closer physical contact with the public in a community than do the other utility properties of the company. A comparatively small investment in improved track and new cars is quickly brought to the attention of the public and reacts to the credit of the entire holding organization.

A number of recent examples have been observed in which very gratifying results have been obtained from such a policy in handling the small railway property. On the other hand, failure to appreciate the possibilities of the situation may lead to a general spirit of antagonism toward the entire utility organization. The past difficulties of the railway should not be allowed to influence the judgment of a new management when such a property has been included in some general consolidation program.

Reduction of Noise Has Great Possibilities

A RECENT development in plans for merchandising railway transportation, both in this country and abroad, is the reduction of noise to a point where it is not objectionable to the passengers. While this applies most particularly to subway service, it is in large measure desirable for surface cars also, especially since the bus interests have made a great talking point of the noiselessness of the gasoline vehicle in their "ride on rubber" campaigns.

An article printed elsewhere in this issue describes the tests made on the London Underground and the results obtained. The findings have been applied in the design of new cars.

It appears that much can be accomplished in the way of noise reduction if a careful study is made of the problem. Even though the steel car is admittedly much noisier than the wooden car, its use is necessary in certain cases, such as tunnels and subways, and is desirable elsewhere. The methods now being used in London to deaden and deflect the noise are not especially radical. They consist principally of the insertion of sound-absorbing material in the roof, walls and floor of the car, shrouding of the trucks with leather hoods so as to confine the sound produced in the running gear, and the use of heavy, permanently closed windows. Ventilation is obtained through special devices with baffle plates to keep out the sound.

Had conditions permitted a treatment of the fundamentals of design in order to eliminate the sources of noise an even more vital contribution to the technique of noise prevention might have been made. For in-

stance, the investigation gave proof, if any were needed, that the major source of noise proceeds from the contact of the wheels on the rails. A further line of investigation is thus indicated. A carefully planned series of experiments might well lead to the development of some new type of wheel, truck and gearing that will function as well as the rigid wheels and driving mechanism of the modern car. These, while excellent mechanically, tend to produce a great deal of noise in operation, and a substitute form of drive conceivably might be quite as satisfactory and still much quieter.

Modernization Committees Deserve 100 per Cent Co-operation

MUCH interest has been taken in the work of President Budd's two new committees of the American Electric Railway Association, those on city operation and interurban operation. As it was pointed out in these columns some time ago, the purpose of these committees is to speed modernization, which is felt to be the outstanding need of the industry. While it is yet too early to make any prediction of the good that actually will be accomplished, they have already made a good start.

A number of the other committees of the association have not yet held their organization meetings, but these two have had their personnel completed for more than a month, have worked out a rather elaborate plan for dividing the country into districts, and have sent out letters to every electric railway in the United States and Canada, whether members of the association or not, informing them of the work to be attempted and asking co-operation. Replies are just beginning to come in, and they all indicate hearty agreement with the aims of the committees and assure fullest co-operation. One manager states that if a concerted effort of this kind had been made ten years ago, at least 50 per cent of the interurban companies that have gone by the board could have been saved.

The plan of campaign calls for personal visits to all properties in the country by the regional vice-chairman of the two committees, fourteen in number, covering the seven districts into which the country has been divided. The work has progressed far enough that the first visit already has been made by one of the vice-chairmen of the committee on city operation.

To obtain the greatest good for the industry it is essential that the regional vice-chairman obtain full information on the best practices of the companies they visit. Even though there may be but one small item of outstanding value on a particular property, still it is the function of these men to discover it and pass it on to the other companies. In return, each property will get the benefit of all that is found of value on all the other properties. It is expected that the plan of disseminating such information will be furthered by preparing reports for publication in the technical press of the best material developed, so that it will not be necessary to wait for the presentation of the formal reports to the association before the information is made available.

Altogether, the plan is a very broad-gage one and merits the confidence of all companies. Not only will they be doing something of value to the industry in giving their whole-hearted co-operation, but they will gain much that can be applied directly to their own work, and hence should strengthen their own positions with the public, their employees and the investor.

Pennsylvania Railroad Builds Three Experimental Locomotives

One of These 200-Ton Engines Is for Freight Service on Alternating Current and the Other Two for Passenger Service on Direct Current—Motors and Mechanical Parts Are Identical to Give Interchangeability

WITH the prospect of extensive main-line electrification, including that of the Altoona grade, before many years, the Pennsylvania Railroad placed in service in the spring of 1917 a split-phase locomotive of 4,000-hp. continuous rating. This locomotive was described in the *ELECTRIC RAILWAY JOURNAL* of June 9, 1917, page 1048. The war, government control of the railways, and other causes delayed the test of this locomotive, which is now in regular freight service between Philadelphia and Paoli.

The railroad has now designed another type of locomotive for freight service. As an experiment, it is planned to equip the same locomotive for high-speed passenger service simply by changing the gear ratio and control devices.

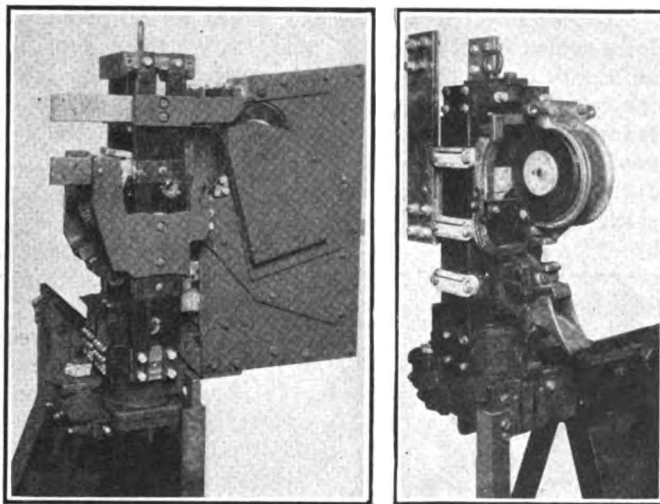
At the company's Altoona shops there are now being built three of these locomotives. The electrical parts have been supplied by the Westinghouse Electric & Manufacturing Company. One is to be used for freight service on the single-phase a.c. trolley, while the other two are to be given extensive tests to determine their adaptability for passenger service, after which it is proposed to use them as d.c. locomotives on the New York tunnel and terminal division of the railroad.

Each locomotive will weigh approximately 400,000 lb. and will be equipped with four single-phase commutator-type motors. These motors have a continuous rating on single phase of 760 hp., giving a total locomotive rating of 3,040 hp.

The locomotives have a 2-8-2 wheel arrangement and the so-called steeple-type cab construction. Two motors are connected to each of the two jackshafts. They are mounted outside, and at either end, of the driving wheelbase. Each jackshaft serves two pairs of drivers.

The single-phase freight locomotive will have a gear ratio of 30:118 and a maximum speed of 35 m.p.h. The two locomotives that are being arranged for d.c. passenger service over the New York tunnel and terminal division will have a gear ratio of 50:98, permitting a maximum speed of 70 m.p.h.

Although two of these locomotives are for d.c. operation, while the third is to operate on an a.c. contact

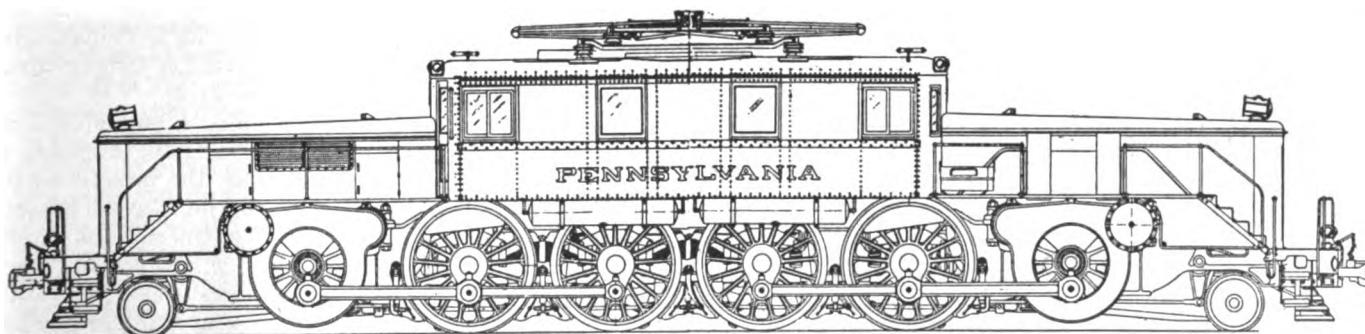


Electro-Pneumatic Unit Switches. At the Left, 3,000-Amp. Switch, of Which Twenty-one Are Used for Each D.C. Locomotive. At the Right, 1,500-Amp. Switch, of Which Twenty-one Are Used for the A.C. Locomotive

line, the motors and all other parts possible are being made identical. The space required for the transformer on the a.c. locomotive is devoted to accelerating resistance on the d.c. locomotive. The pantograph on the a.c. locomotive gives place to the third-rail shoe on the d.c. locomotive, etc.

Side rods will transmit power from the jackshaft to drivers. Flexibility between the motor armature and the running gear will be provided by springs set in the gear center, and flexible pinions in one of each pair of motors geared to their common jackshaft. These springs in the gear center and in the pinion, which are of the leaf type, have been especially devised by the Westinghouse company. They are inserted into their pockets without initial tension, and are so designed that they will be active throughout the operating range of the locomotives.

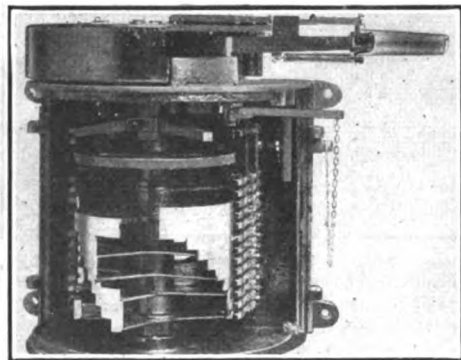
The outstanding feature of the a.c. freight locomotive is the traction motor, which has the largest capacity possible under the limitations prescribed by the



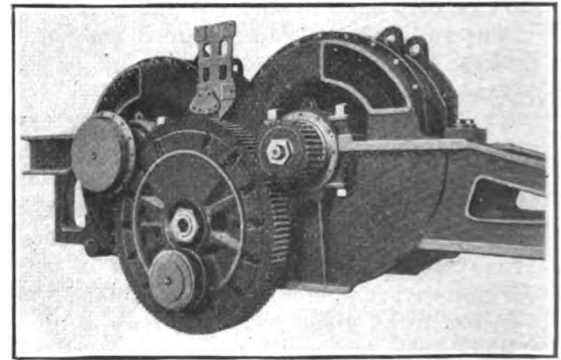
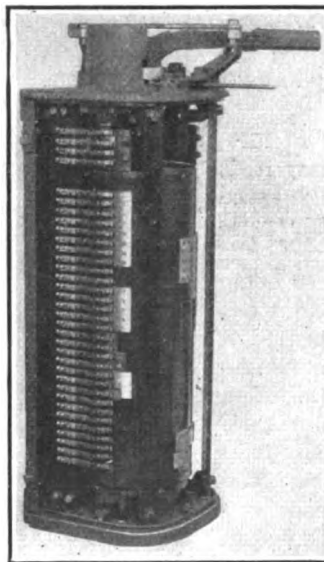
This 200-Ton Experimental Single-Phase Road Locomotive for Preferential Freight Service for the Pennsylvania Railroad Is Exactly Similar to the Passenger Locomotive

Pennsylvania Railroad, and incidentally the greatest capacity of any single-phase commutator type traction motor ever built in this country. The outside diameter of the frame is 76 in., while the motor is 43½ in. long. The main frame of the locomotive forms a cradle into which the motor is inserted, thus making the latter an integral part of the main frame. The motor bearings are carried on the locomotive side frames and are entirely separate from the main frame of the motor. In order to maintain the motor rating forced ventilation is employed. Air is drawn through the motors instead of being blown, as is customary.

Another novel feature is the use of an oil-insulated, force-cooled transformer. The transformer tank is built into the locomotive, but is entirely separate from the cab structure. Its base rests on pads on the main frame, while the top is formed by a portion of the cab roof. The sides of this tank are formed from a single sheet of steel, with a vertical riveted seam. The



The Master Controllers. Above, for the D.C. Locomotive; Center View, for the A.C. Locomotive



Above, Two of the Large Single-Phase Motors Mounted in Cradle, Showing the Springs in the Gear Center

bottom is a cup-shaped piece set into the side sheets and riveted into place. The cover is made integral with the locomotive cab roof, so that the removal of the transformer core can be accomplished by simply removing that portion of the roof directly over the transformer.

The transformer oil will be cooled by being pumped through a forced-ventilated radiator.

The locomotive has three motor-driven blower sets. The one for the transformer has an oil-pump for circulating the oil, while the other two, one for each pair of traction motors, furnish air only. Otherwise the three are identical.

The traction motor control apparatus consists of a master controller, a reverser, the necessary unit switches for a notch-by-notch voltage increase to the normal voltage of the traction motors, preventive coils, and the minimum number of relays consistent with safety. A small motor-generator set is used for charging the control and lighting storage battery. The brake system is of the standard locomotive type. The brake lever system is designed for clasp brakes, giving 100 per cent braking power at the driving wheel. The above constitutes practically all of this very simple locomotive. The locomotive capacity is as follows:

	Continuous	Hourly
Traction effort, pounds.....	50,000	62,000
Speed, miles per hour.....	23	19.75
Maximum traction effort, pounds (at 33½ per cent adhesion) ..	100,000	
Maximum speed, miles per hour.....	85	

This means that the locomotive is capable of hauling 2,370 adjusted tons up the western slope of the Altoona grade at an approximate speed of 24 m.p.h.

The principal dimensions, which apply to both a.c. and d.c. locomotives, are as follows:

Distance between centers of each pair of drivers.....	7 ft. 5 in.
Distance between centers of jackshaft and nearest driving axle	8 ft. 2 in.
Driving wheelbase	22 ft. 3 in.
Total wheelbase	54 ft. 11 in.
Diameter of drivers	30 in.
Diameter of leading wheels.....	34 in.
Length over frame	63 ft. 8½ in.
Length, inside to inside of pulling knuckles.....	68 ft. 2½ in.
Height, rail to roof of cab.....	13 ft. 4½ in.
Height, rail to top of pantograph when in lowered position.....	16 ft. 6½ in.

The passenger locomotives are of the same fundamental design as the freight locomotives just described.

They are intended for operation on the New York tunnel and terminal division, at 600 volts d.c., and are capable of handling the

heaviest Pullman train entering or leaving the New York terminal.

The traction motors are identical with those used on the freight locomotive, and the blower sets are also duplicates. A number of parts on the electrical equipment required for d.c. operation which cannot be made duplicate of the parts on the a.c. engine have been made so as to duplicate parts on the present terminal locomotives. Among these parts may be mentioned the third rail shoes, resistance grids, etc. This will further aid in the ease with which the locomotives can be maintained, and should be a material factor in reducing maintenance costs.

The d.c. locomotives are being equipped with the largest unit switches in existence. These switches are of the standard Westinghouse electro-pneumatic type, and have a continuous capacity of 3,000 amp. The arc rupturing capacity of these switches on a 750-volt circuit is many times this figure. A total of twenty-three switches is required on each locomotive.

These locomotives will be completed and placed in service early this year, at which time it is proposed to make extensive tests to determine the practicability of this type of locomotive both for high-speed passenger and for freight service. If the expectations of the railroad officials are fulfilled, a great advance will have been accomplished in electric locomotive design by this adaptation of one type of locomotive to both freight and passenger service.

Reducing Noise in Train Operation

In an Extended Series of Tests the London Underground System Has Developed Methods of Preventing Noise from Entering the Cars—Sound-Absorbing Material Placed in Roof, Walls and Floor; Heavy Closed Windows, Special Ventilators and Shrouding of Trucks Are Principal Features Incorporated in New Cars

MUCH progress has been made by the Underground Electric Railways of London, Ltd., in its effort to reduce noise in the operation of trains. A surprising amount of research has been done, and while much remains to be accomplished, the amount of noise incident to the operation of underground trains has been reduced and the ear-piercing sounds have been eliminated.

The experiments have shown that it is not the loudest sounds which cause the most discomfort. Certain frequencies in vibrations are much more annoying. Since a large percentage of the noise comes from the truck, some engineers were of the opinion that the body of the car should be isolated as much as possible from the truck. This was tried, but it was demonstrated that the theory is unsound.

London's tube railways follow the deep blue clay stratum which underlies the city. Under the heart of the city the depth of the tubes varies from 20 to 180 ft. The tubes are driven easily because the clay can be cut with a knife and carries no water. Right-of-way is obtained without cost. The tube, however, is not much larger than the vehicles which pass through it. The noise has little chance to escape, and it is reflected from the walls against the cars.

In deep tubes great care must be exercised to prevent fire. A very little smoke is troublesome and causes great alarm among passengers. For that reason no inflammable material goes into the construction of the cars. The small amount of wood used in the strips on the floor is fireproofed carefully. This has limited the materials which could be used in reducing noise and has added greatly to the difficult work on the electrically propelled cars.

Another factor which has had to be taken into consideration in reducing noise is to do nothing which would promote corrosion. Since some of the materials used in the reduction of noise had that tendency, it was found necessary to overcome it by giving the steel sheets a lead bath. This procedure was found to be more than justified since the plating of lead stopped all corrosion which otherwise would be active in the atmospheric conditions such as exist the year around in the tubes. Another compensation for this treatment is the fact that it makes a splendid base for paint.

As a result of an extensive series of experiments, a number of features were incorporated in the new cars ordered for the tube railways tending materially to reduce the noise. One of the first things noticed in the tests made was that the windows, even when closed, were the passageways for the most intense of the sounds. This led to a material reduction in the size of the window and the use of glass $\frac{3}{4}$ in. thick. A narrow strip along the top of the window is made so that it may be opened when the train comes to the surface in the outlying sections. The guards on the train are careful to see that these openings are closed before the train

dives down again on its return trip. The ventilators are so constructed that they can be relied upon to furnish all the air needed, no matter to what extent the car is crowded. The air passing through the ventilators follows a circuitous course so that no direct path may be furnished for sound waves.

All sound boxes are eliminated. Wherever the design of the steel tends to form a box which catches and magnifies sound it is packed with mineral wool or some other non-inflammable substance to deaden the noise. The brake rods run on padding. The brake shoes are made of a composition of asbestos and rubber. Quilted asbestos is laid separating all contacts between steel. Layers of this quilted asbestos cover the entire roof and a $\frac{1}{2}$ -in. layer is placed between the top wooden wearing surface of the floor and the lower plate of steel. The entire car contains a layer of this asbestos, $\frac{1}{2}$ in. thick, on the inside of the body panels. The panel attachments are made with fiber or hard wood to reduce the continuity of vibration.

There has been long experimentation with tires for the car wheels made of soundless materials, but nothing has been found as yet which gives promise of replacing steel for that use. These experiments are continuing. Hope of their ultimate success has not been abandoned. If the noise arising from the contact between the rail and the steel tread of the wheel could be eliminated it is recognized that the principal cause of noise would be overcome.

Deflecting plates have been placed on the sole bar near the bogies to assist in preventing noise rising from them, and the trucks are shrouded with a leather skirt.

Much attention is given to the maintenance of the roadbed. By preserving exact levels much noise is obviated. Incidentally, it has been found very profitable to keep the roadbed in a high mechanical state of perfection, since it reduces greatly the wear and tear on equipment.

HOW THE NOISE WAS MEASURED

These noise-deadening features of the new cars were decided on as the result of an extended series of tests made under the direction of Prof. A. H. Low of the Low Engineering Company, Ltd. In the investigation it was found necessary to consider both causes and effects of the noises occurring in tube operation. The pitch was considered in addition to the total amount of noise, on account of its effect in interfering with conversation.

The intensity of the noises was measured by the use of an ingenious device consisting of a trumpet to catch the sound, and arranged so as to cause a diaphragm to vibrate. This vibration operated a mirror, causing a beam of light to play on a sensitized film, much like a reflecting galvanometer.

Almost the first records disclosed that the windows, even when closed, were the passageways for the most

intense of the sounds, but that by making them small and of extra thick glass the admission of sound could be reduced to a great extent.

One of the conclusions reached was that shrouding of the trucks was a great factor in reducing noise, as a large portion of the sound was generated by the contact of the metal wheels on the metal rails. The shrouding need not be great, but it should slope outward from top to bottom, should not have any air gaps and should be well stream-lined.

If air is not admitted direct, as through the windows, but the intakes are baffled properly, the noise is not seriously increased.

Damping of the panels was found of great advantage, but little difference was seen between felt and asbestos when they are not compressed under boards. Floor damping was not found so essential. For this purpose, however, loose material with a rubber foundation was determined to be the best.

RESULTS OF THE ENGINEERING INVESTIGATION

The following extracts from the original report of Dr. Low to the company cover the principal features investigated:

For practical purposes it is not possible mechanically to construct various parts to such limits as would avoid sounds of all kinds, when the source is so completely inclosed as in the average tube railway. It is, therefore, necessary to realize that all that can be done, while reducing the wave production as far as possible, is to insulate the passengers against excessive sound.

In cases such as are experienced in the tube railways there is usually a complete conflict of sound and noise, and the resulting oscillations of the atmosphere are such as to be without any definite wave slope. This renders it necessary to attend to every detail of sound, however apparently trifling. Total oscillation is reasonably easy to distinguish to the average ear, and therefore an audiometer of the damped diaphragm type is sufficient to measure total sounds and noise and to approximate the wave shape, with the ultimate object of tracing the sources and paths of the vibrations.

On the London Underground Electric Railways there is a general tone of noise which is very typical. On a photograph taken by the audiometer it was found to consist largely of two self-damped waves, occasionally beating together, but more often reflected after an original beat or resonance effect. This is quite clearly the result of one particular note undergoing reflection at different points of the containing tube's surface or support, and the use of a plain stethoscope confirms the opinion. This was checked by tapping a stationary carriage.

The floor does not reproduce the main note to any extent, and when damped with $\frac{1}{2}$ -in. asbestos no noticeable improvement is obtained. On the other hand, the roof, windows and sides, bare or covered, reproduce the exactly typical "tube roar" showing a far higher and more varying period than the floor. The floor vibration is quite slow. This was checked by a vibrometer. It was not to be expected that covering the walls would assist matters as much as an insulator, because no close contact can be obtained and the sound is reproduced and amplified via the air spaces, often in such a manner as to resound with the main noise. Opening the windows merely increases the main note, and by damping the air inlet or using ventilators separated by a sufficient distance to prevent direct sound connection, allow-

ing for car speed and windage, an improvement results, sound being comparatively slow in its movement.

The windows and ventilation openings cannot be conveniently doubled or blocked out. It is quite simple, however, to produce artificially, as by the movement of the train, a sufficiently high blast of wind to prevent effective sound transmission; also to rubber-insulate the windows and increase their actual rigidity by thickening the glass and adding double-padded posts.

The majority of the noise can be itself divided into three classes:

1. Wheel and rail shock.
2. General loose rattle.
3. Motor and gear noises.

These three individual wave forms are very much interdependent, and both original and resultant noises are blended and selected by reflection, resonance and reverberation.

The motor noise, type 3, is caused by the wheel jumping and consequent rock of the motor toe, with horn-plate movement, etc. Apparently better results may be obtained by using helical gears and impinging a jet of oil on the actual point of contact at entry. Insulation of the motor is important, but this class of noise, when transmitted, is of too high a periodicity to be objectionable at a later stage.

Noise wave, type 2, is due to many details which can be corrected with relative ease. Rubbing bars should be kept in permanent contact by flat intention springs. Axle boxes can be held to the horn-plates in the same manner, but, better still, a floating type of axle with radius rods would be simple, cheap, silent and easy of maintenance and lubrication. Looseness of the actual axle bearing is not in itself serious. All brake and car couplings can be held by springs, in order that the first operative movement will serve only to compress the spring and take up slack. No difference would be made in the working, and the blended noise rattle would be obviated, particularly if straight coupling could be adopted.

WHEEL AND RAIL SHOCK CAUSES MOST NOISE

Wave type 1, that of wheel and rail shock, is far the most serious source of irritation and is greatly aggravated by the formation of both longitudinal and transverse vibrations within the tube itself. The particular form of damped oscillation produced is of low frequency, and it is so irregular that it is capable of resounding and combining with notes and noises of pitches varying over a wide range. In consequence, the slightest rail vibration, excluding rattles, is communicated to the "rolling wave" and produces recurrent reverberation and resonance.

To illustrate this point an experiment has been conducted with a plain reflection tube of 3 in. diameter and 3 ft. long. When such a tube is struck by a hammer or a ball rolled down its length a distinct "tube" rumble is obtained. This disposes of the suggestion that local windage obtained by drilling the main girders, or that the motor or other self-contained noises on the train can possibly produce the chief resonance which is so objectionable. If the tube model is struck centrally by a hammer a node is formed at some distance, and the same may apply to the rail itself, which, magnified, presents a series of serrations.

From this and other experiments with the model tube Professor Low draws the conclusion that if the speed of sound in the tube is compared with the speed of travel,

at fairly high speeds the roar can easily be due to a beat between the roof and the tube-reflected sound and the wheel roll.

It has already been proved by a stethoscope that the floor and lower sides do not transmit much noise. Damping the floor with asbestos gives little improvement, and yet if windows and ventilators are closed there is a vast improvement from the addition of packing.

If in the prepared carriage a bay is left uncovered, the noise from the sides is not much greater when in contact, but at the center of the carriage the noise is far worse. On the contrary, if the roof and all sides are covered a still greater improvement takes place.

Unless the air pressure falls rapidly enough to break the wave, it is noticeable that except at such points the station gaps do not cure the sound, though with shrouded bogies the reflection time is greater and consequently the improvement is disproportionately increased. This suggests that if the lower wheel-carrying portions could be fitted closer to the tube by the interposition of some anti-vibratory substance, and by some attachment of high natural frequency, the noise could be reflected forward or backward, so that less resonance would occur. This would not reduce the apparent sound volume, except to a passenger in the car. The same reasoning applies to air ventilation, which should clearly never be direct. The ventilators should be louvred heavily. By means of shattered air scoops ventilation could be had through windows operated by the passengers, and as long as direct connection is avoided there will be no singing of the air in resonance with the main note.

The air pressure due to the rapid motion of the train can be utilized as a screen, and at the same time the effective length of the air column under the influence of the train should be reduced by stream-lining the sides and end of the train, in order that the natural period of this air column may be increased beyond the oscillatory period.

BREAKING UP SOUND WAVES ESSENTIAL

As a definite conclusion it will be seen from an audiometer photograph representing the noise with all parts padded and doors closed, but without shrouding, that closing of the doors has a great silencing effect. This is borne out by the marked increase of noise from an unprotected bay of seats and from the reduction of noise by closing the ventilators, so that no short sound path is available. During this "noise photograph" the car was inclosed almost completely in asbestos covering, but only the sides and the roof really needed protection. No single wave was produced, proving conclusively that the recurrent beat from the vibrating sides and the wheel roll caused the trouble.

There is no reason why a car should not be solidly built with cork or asbestos padding fireproofed and inserted tightly between the double walls. Rattles can easily be prevented by solid construction of running gear; ventilators can be made indirect; doors can fit well, and windows can be thickened and held in thick rubber insertion. Heavier gangway partitions would follow as a matter of course. If fiber centers or complete fiber wheels cannot be adopted, the wheels can be made less liable to jump and chatter by altering the period of the supporting spring. Considerable lengthening is most desirable, as also is proper spring lubrication.

That the wheels are far from steady, even on a good road, is made very clear when the ultra-rapid cinema

points are measured up. The wheel is not maintained in proper resultant position by the present loose method of carrying, and its lifting periodicity does not vary greatly from the oscillatory period of the general noise wave as shown by the audiometer.

The rail fastenings are of great importance when in an atmosphere rather higher in pressure than that to which the passengers' ears have been accustomed. This tends to assist the sound to travel, unless the air is impeded by deflectors and sheaths to obtain the correct reflection. Packing up the rail track to reduce actual rail noise is fairly effective, but insulation from and the avoidance of resonance are the two points of greatest importance from the aspect of the traveler.

METHODS PROPOSED TO REDUCE NOISE

The things that should be done in order to reduce the noise due to train movement, as developed in the tests, are summarized below in a list of practical suggestions:

1. The track should be packed as high as possible with fine ballast.
2. Fishplates and rail couplings should receive attention.
3. The whole of the brake and coupling gear should be fitted with flat intention springs, including rubbing blocks.
4. All doors, gates and trellis couplings should be held on ball catches which take up wear.
5. Fiber or fiber-supported car wheels are advantageous.
6. Carriage springs should be increased in length and lubricated by inclosure if possible.
7. Motor gears should be lubricated by a directly applied oil jet under pressure.
8. The lower part of carriages should be stayed in both directions, particularly where the girder surrounds the wheels.
9. The sides, roof and doors of carriages should be stiff and double. The entire space should be packed with cork powder, slag wool or asbestos compound. This point is of paramount importance.
10. The window ventilators should not open and louvres should be fitted with wind deflectors outside, and not opposite to the entrances.
11. The carriages should be stream-lined as far as possible and the space between them sheathed in with leather supported in trellis couplings. Both ends of the train should be fitted with wind-cutting ends, or the carriage ends should be made more curved.
12. Windows should be slightly reduced in size, increased in thickness, and held in rubber insertion at least $\frac{1}{8}$ in. thick.
13. All loose chains and wires between carriages should be spring-held and covered with cloth bagging.
14. Wheel bearing play should be reduced if possible and a torque rod system substituted. The brakes need not then hang on one bar, which is bound to cause chatter in one direction. Brake shoes should not be in one piece, and two units should be fitted to increase the chatter period.
15. The wheels and all parts below the stepboard should be heavily shrouded to deflect the sound, and as far as possible each wheel should be well shrouded with a small wind scoop arranged on the leading edge. This was found extremely effective in practice.
16. If possible, a minimum of actual wheel should be visible in elevation. The shrouds should be of a heavy substance of very high natural period, such as malleable

cast iron lined with fiber. It is important to insulate the lower parts altogether.

17. The insulation of motors, etc., by mounting on fiber is almost useless. The noise is wheel rolling reflected from the tube sides, which beating inside, with the window carriage side and roof vibration, mixes with the resonance externally produced by the entire combination of sounds and noises.

18. Larger wheels might be fitted on some cars.

19. Where wood is used an improvement is noticeable; metal supports should never be attached at one point only. The wooden car note is slightly lower in pitch and of less varying amplitude. This renders the sound less objectionable in character, but apart from this fact the improvement is not great.

20. Cross seats are a slight advantage in preventing a long fixed air column to vibrate.

21. Motor armatures should be balanced accurately to eliminate excessive vibration.

In a final set of experiments triplex windows were used with padded center posts to break up the large dimensions.

The results were very satisfactory, particularly when the glass was partially covered by a small piece of paper.

The joints of doors were also carefully fitted. An appreciable reduction of noise is obtained by shrouding alone. To obtain proper results from shrouding, roof padding is needed, as the object is chiefly a reduction of resonance.

For this reason shrouding does not reduce the apparent noise to any one outside the carriage.

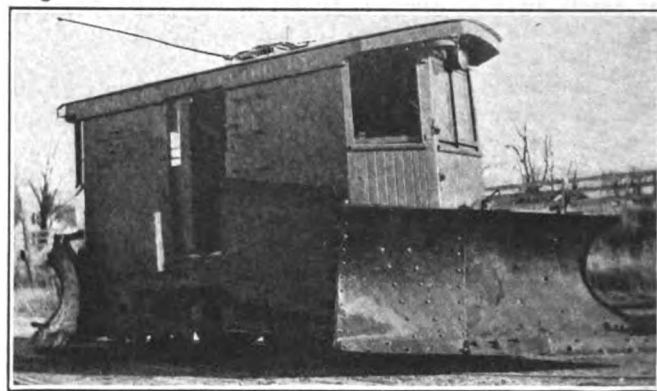
It Pays to Send Out the Snow Plows Promptly

How the Portsmouth Electric Railway Keeps Its Line Open in Winter Despite Heavy Snows—Low Rail in Open Country Increases Difficulty of the Task—Taunton Plow Has Special Nose

THE winter of 1922-1923 was one of the most severe that has visited New England in many years. Between Dec. 1 and March 1 nearly 100 in. of snow fell, and as there was no protracted period of thawing the depth of snow on the ground kept increasing until it was piled alongside the tracks of the Portsmouth Electric Railway as high as the roofs of the cars. On March 7 there was a snowfall of about 6 in., driven by a 40-mile gale. The snow piled into the cuts to such an extent that it was impossible for the plow to throw



In the Cuts the Plows Could Not Throw the Snow Over the Accumulated Piles



This Snow Plow Is Equipped with an Adjustable Wing Which May Be Swung in Where the Clearance Is Small

it over the top of the bank, and the line had to be cleared by shoveling. In spite of such severe conditions as these, however, the railway was successful in keeping its lines open all winter. The policy of sending out the snow plows promptly when the snow began to fall and keeping them out until the storm ended is thought to have been responsible for this success.

The Portsmouth Electric Railway operates two lines in the city of Portsmouth, N. H., and an interurban line from Portsmouth to Rye, Rye Beach and North Hampton, connecting at the latter point with the Exeter, Hampton & Amesbury Railway. One of the difficulties with which the railway has to contend in winter storms is the fact that much of the line in the open country is built with low rail. The snow-fighting equipment consists of two Wason 15-ton plows and one Taunton 18-ton plow. The Taunton plow is equipped with a special nose, as shown in the accompanying illustration, and is ordinarily assigned to the interurban line. One Wason plow takes care of about 7 miles of city track. The third plow is for emergency and is not used unless one of the two others becomes crippled or in case the storm is so severe that two plows are insufficient to keep the lines open.

A crew of four men is used on each of the Wason plows and a crew of three men on the Taunton plow. These men come from all departments of the railway. For example, a typical plow crew consists of one trainman, one shopman, one trackman and one lineman. As each man has his part to do they always go out together in the same crew. This has been found to be the best practice. As soon as a storm begins the snow-fighting crews are assembled, although this is done beforehand if advance notice has been received from the weather bureau.



Nearly 100 In. of Snow Fell in Portsmouth During December, January and February Last Year

How to Secure Better Public Relations

**Bad Treatment of Utility Corporations Results from Personal Grievances of Customers—
Public Relations Committee Should Make Company Better Understood—Its Manager
Should Take Active Part in Civic Affairs—Correct Attitude of Employees
Important—Securities Should Have Wide Distribution Locally**

By E. C. Hathaway

Chairman of the Board, Railway Audit & Inspection Company.
Formerly Vice-President and General Manager Norfolk & Portsmouth Traction Company, Norfolk, Va.

WITH the growth of commissions, many railroad men feel that there are marked socialistic governmental tendencies in this country at present and that a large portion of the public favors municipal ownership and operation of utility corporations. This is a point upon which I take issue.

In the first place, the average American is always ready to exercise his prerogative of criticising those conditions which do not suit him. The utility corporations are usually in the front line trenches and so are apt to receive the shot first. This does not mean that there is any inherent prejudice against the corporations as such. The criticism they have to bear comes from their impersonal character. Any person who criticises his local railway, lighting and power company or gas company knows that, except in an impersonal way, it is utterly impossible for the corporation to defend itself. It is almost unknown to have a customer of a large dry goods store or other business rush into public print to tell how badly he has been treated in a business way either by that store or its employees. This, I take it, constitutes the fundamental difference between the two attitudes of the public.

In many cities the wholesale and retail business concerns do more business annually than any one of the utilities, but the critical customer has always the privilege, if he is dissatisfied, of patronizing some other concern in the same line of business. This is not possible with the utilities, which are natural monopolies, so that the customer has to accept conditions as they are or go after the corporation in whatever manner seems likely to be the most effective to him.

MANY CRITICS HAVE PERSONAL GRIEVANCES

I have personally investigated a great many of these criticisms of public service corporations and have found, in the last analysis, that the cause was nearly always bad treatment of the critic by some employee of the corporation. This shows the necessity of instilling into all employees who come in contact with the public the need of keeping the customer satisfied. It matters little whether the monthly bill is \$1.50 or \$500. The principle involved is the same in all cases. Often-times an individual of small caliber will make it exceedingly difficult for the management to do business with either the council or the corporation commission, as the case may be. It is important to have the employees of a public utility company realize that the sale of its service is purely a commercial proposition, and it is as vital to make the customer feel he is being treated with proper consideration as in the case of the retail merchant.

The cities in which utilities operate are naturally

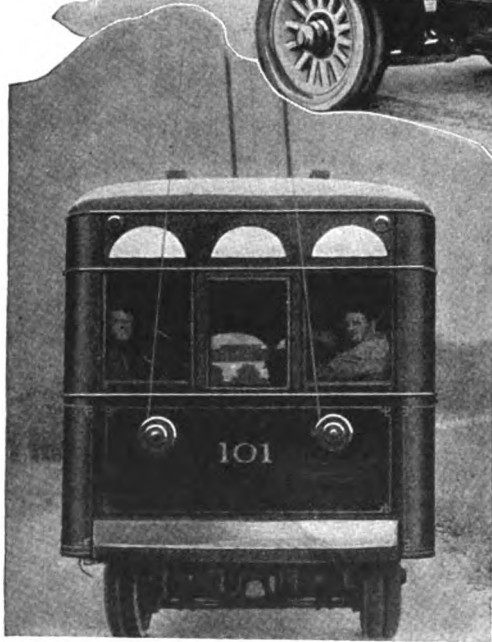
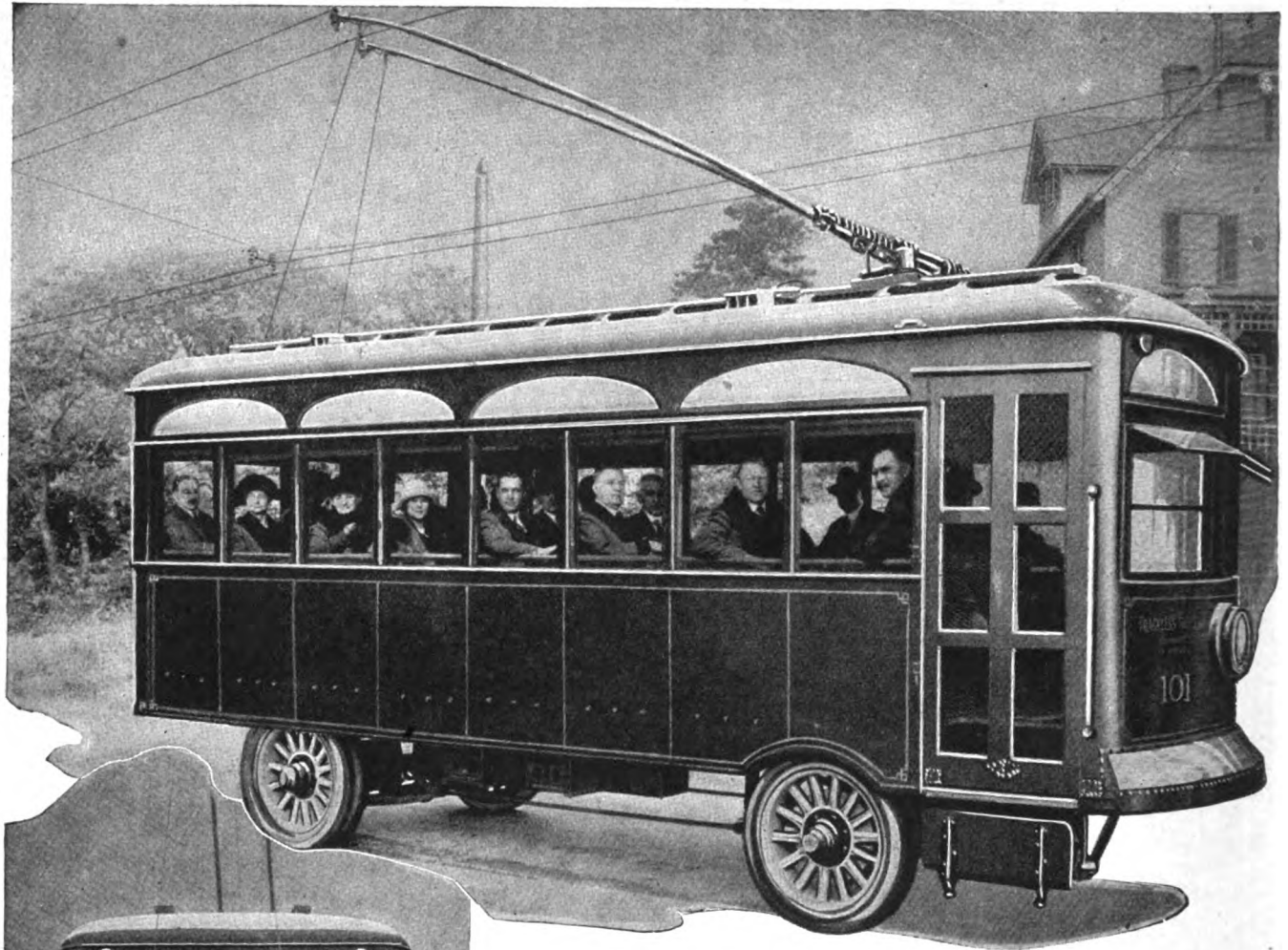
divided into two classes. The first is the medium-sized city, in which the general manager of the utility is practically on hand-shaking terms with the vast majority of his customers. The second is the city where it is impossible for this personal relation to exist. In the latter case it becomes necessary for the corporation to create a practical contact with the public that will inure to its benefit, so far as personal relations are concerned. A move which I strongly favor is to create from the board of directors a "public relations committee," this committee to be represented by a man who is not only willing but enthusiastic to present the company side of the case and with a natural flair for making friends.

This has been done to a great extent in the past, but the men engaged for the service have been paid inadequate salaries and their function, it was presumed, was either to get favorable publicity from the newspaper people or to be able to damp criticism in such papers should it exist. This is wrong.

QUALIFICATIONS OF THE PUBLIC RELATIONS MANAGER

Primarily, the man should be selected with a full knowledge of his personal characteristics. He should be a fluent and ready speaker. His duty should be to identify himself with every public movement, and he ought not to feel himself too important to go out and address a meeting of twenty people, if it were necessary, or five hundred if the opportunity should present itself. He should have the proper sort of an office, with adequate space. All complaints of whatever character should be delivered to his office, and it would be up to him to study and analyze these complaints, find out whether they are merely the result of some small difficulty and, if so, be in a position promptly and definitely to adjust the situation after the responsibility has been fixed. He should be a member of the leading clubs of the city, social, business or otherwise, and he should be expected not only to identify himself with these clubs but to attend carefully all the meetings so that he would be in a position to forestall or explain any shortcomings of the company, whether they are real or fancied. Finally and unquestionably, he should receive the fullest confidence and support of the operating management. Some of the keenest operators of public utilities in the United States, men who can secure results, who are economists to the highest degree, ought never to be permitted to come in contact with the public or to plead the company's cause with the people, because their general trend of mind and reasoning are such as to unfit them for small adjustments, and they are naturally not diplomats.

In the creation of such a department it might be a



Trachless Trolley Company four-wheel-drive trolley bus

Four Wheel Drive for Trolley Buses

A four-wheel-drive trolley bus equipped with G-E Motors and Control was recently placed in operation on the Oregon Avenue line in Philadelphia.

Each bus is equipped with four GE-1094—14-h.p.—Motors and with G-E standard foot-operated type M non-automatic Control. Rapid acceleration and maximum speed of 25 miles per hr. are obtained.



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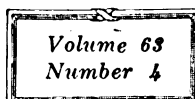
New York, January 26, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*



Main Value of Electrification Is Increased Use of Entire Plant

GRADUALLY the ideas regarding the value of electrification for steam railroads are becoming clarified. One by one the important terminals are being converted to electric operation to eliminate the smoke nuisance and to permit underground entrances to large cities.

Electrification for main trunk lines, on the contrary, has been deferred in many cases because it has not been possible to figure a direct monetary saving as the result of the necessary investment in electric equipment. The commonly made comparison between operation of the existing service with electricity as against steam is to compute the cost of each, figuring the various items as estimated by the engineer in charge, who usually has had years of steam railroad experience but who is relatively unfamiliar with what electric traction can do.

With the improvements that have been made in steam locomotives in the past few years, the one-time large advantage of electric operation in fuel economy has ceased to be, if it ever was, a convincing argument in favor of electrification. Unfortunately, it is on this narrow basis that the decision has frequently been made not to electrify.

Looking at the problem in this way is taking a short-sighted view of a situation that is now confronting the railroads, and that will become increasingly serious as the density of traffic increases. Many of our railroads were constructed originally for much less tonnage than they are now hauling, and the demand for transportation, both freight and passenger, is fast coming to the point where it cannot all be handled. This is almost certain to come from one or both of two main causes—insufficient main line track capacity or inadequate terminals.

Track capacity is determined by the number of trains that can be handled safely over it, and this in turn is a function of the train weight and speed. Each road is almost certain to have a ruling grade, a tunnel, a stretch of single track, or other limiting section that determines the capacity of the entire system so far as through traffic is concerned. Remove this and more trains can be hauled.

The simplest way to increase the capacity is, of course, to construct additional tracks on the limiting section. Due to the very nature of the limiting section, which is determined largely by the topography, this may, however, be difficult, so that remedies must be considered that will increase the ability of the existing tracks to handle cars. No way has yet been devised to do this that can compare with electrification. Making the locomotive a transformer rather than a generator of power removes many of the limitations, both of the physical layout and the movements over it, so that the line can be used more intensively.

The electric locomotive also is particularly flexible, both as to permissible speed and ability to be coupled up in various combinations to adjust locomotive capacity for various loads. Not only can one crew handle the combination but the several units work absolutely in unison. This makes possible a large increase in the tonnage that can be hauled in one train, and in the schedule speed at which it can be moved.

The Lesson of the Virginian Electrification

THE decision to electrify the Virginian Railway, which was the outstanding event of last year in the heavy traction field, well illustrates how the capacity of the plant will be increased. Steam power had about reached the limit on the ruling division of the road. Some of the heaviest Mallet engines in the world were being double and triple headed, and even then the speed up the grade was only 7 m.p.h. for maximum trainloads of 5,500 tons.

This was very good performance under steam operation, but it was not enough. The tracks elsewhere on the system were not working to capacity on account of this division, even though the best thought of locomotive designers and operators had been concentrated on the problem of freight movement. Electrification was the logical answer, for by its application the trainloads will be increased at once to 9,000 tons, and if necessity arises in the future they can be still further augmented to 12,000 tons. Furthermore, the speed on the ruling grade will be doubled. This means that the entire system will have its capacity raised greatly.

The lesson of the Virginian can be applied in many places. Thus it is not merely to handle traffic more expeditiously over the mountain or other limiting divisions that electrification is of value. It is the ability of the electric operation to make possible an increase in the usefulness of the entire plant.

Suppose, for instance, a railroad with a total investment of \$100,000,000 has reached its maximum ability to handle traffic. If electric operation, whether for the ruling division only or for the entire system, can double the capacity of the road, the earning power of the entire investment has been increased just that much. If, for instance, the cost of electrification to do this is \$20,000,000, it will accomplish as much as the construction of a duplicate steam road for \$100,000,000.

Looking at the problem in this way, it is not a question of whether the pounds of coal burned is greater with one system than with the other, or that the maintenance per locomotive is more or less. It is the relation of electrification to the earning power of the entire system that should govern the decision.

Making the Railway a Good (Not Bad) Advertiser of the Holding Company

IT FREQUENTLY happens that there is included in a holding organization composed primarily of power companies one or more small railway properties.

Because of past performances, these railway properties are sometimes taken over with considerable misgiving at the time of the consolidation, and are treated very much as a doorstep foundling in an unwelcome household. The spirit and appearance of the orphan is quickly reflected in the attitude of the public as the result of the condition of the physical equipment with which they come in contact.

A number of progressive utility managers have appreciated the possibilities of such small railway properties as points of contact for the establishment of favorable public relations, making as they do a very much closer physical contact with the public in a community than do the other utility properties of the company. A comparatively small investment in improved track and new cars is quickly brought to the attention of the public and reacts to the credit of the entire holding organization.

A number of recent examples have been observed in which very gratifying results have been obtained from such a policy in handling the small railway property. On the other hand, failure to appreciate the possibilities of the situation may lead to a general spirit of antagonism toward the entire utility organization. The past difficulties of the railway should not be allowed to influence the judgment of a new management when such a property has been included in some general consolidation program.

Reduction of Noise Has Great Possibilities

A RECENT development in plans for merchandising railway transportation, both in this country and abroad, is the reduction of noise to a point where it is not objectionable to the passengers. While this applies most particularly to subway service, it is in large measure desirable for surface cars also, especially since the bus interests have made a great talking point of the noiselessness of the gasoline vehicle in their "ride on rubber" campaigns.

An article printed elsewhere in this issue describes the tests made on the London Underground and the results obtained. The findings have been applied in the design of new cars.

It appears that much can be accomplished in the way of noise reduction if a careful study is made of the problem. Even though the steel car is admittedly much noisier than the wooden car, its use is necessary in certain cases, such as tunnels and subways, and is desirable elsewhere. The methods now being used in London to deaden and deflect the noise are not especially radical. They consist principally of the insertion of sound-absorbing material in the roof, walls and floor of the car, shrouding of the trucks with leather hoods so as to confine the sound produced in the running gear, and the use of heavy, permanently closed windows. Ventilation is obtained through special devices with baffle plates to keep out the sound.

Had conditions permitted a treatment of the fundamentals of design in order to eliminate the sources of noise an even more vital contribution to the technique of noise prevention might have been made. For in-

stance, the investigation gave proof, if any were needed, that the major source of noise proceeds from the contact of the wheels on the rails. A further line of investigation is thus indicated. A carefully planned series of experiments might well lead to the development of some new type of wheel, truck and gearing that will function as well as the rigid wheels and driving mechanism of the modern car. These, while excellent mechanically, tend to produce a great deal of noise in operation, and a substitute form of drive conceivably might be quite as satisfactory and still much quieter.

Modernization Committees Deserve 100 per Cent Co-operation

MUCH interest has been taken in the work of President Budd's two new committees of the American Electric Railway Association, those on city operation and interurban operation. As it was pointed out in these columns some time ago, the purpose of these committees is to speed modernization, which is felt to be the outstanding need of the industry. While it is yet too early to make any prediction of the good that actually will be accomplished, they have already made a good start.

A number of the other committees of the association have not yet held their organization meetings, but these two have had their personnel completed for more than a month, have worked out a rather elaborate plan for dividing the country into districts, and have sent out letters to every electric railway in the United States and Canada, whether members of the association or not, informing them of the work to be attempted and asking co-operation. Replies are just beginning to come in, and they all indicate hearty agreement with the aims of the committees and assure fullest co-operation. One manager states that if a concerted effort of this kind had been made ten years ago, at least 50 per cent of the interurban companies that have gone by the board could have been saved.

The plan of campaign calls for personal visits to all properties in the country by the regional vice-chairman of the two committees, fourteen in number, covering the seven districts into which the country has been divided. The work has progressed far enough that the first visit already has been made by one of the vice-chairmen of the committee on city operation.

To obtain the greatest good for the industry it is essential that the regional vice-chairman obtain full information on the best practices of the companies they visit. Even though there may be but one small item of outstanding value on a particular property, still it is the function of these men to discover it and pass it on to the other companies. In return, each property will get the benefit of all that is found of value on all the other properties. It is expected that the plan of disseminating such information will be furthered by preparing reports for publication in the technical press of the best material developed, so that it will not be necessary to wait for the presentation of the formal reports to the association before the information is made available.

Altogether, the plan is a very broad-gage one and merits the confidence of all companies. Not only will they be doing something of value to the industry in giving their whole-hearted co-operation, but they will gain much that can be applied directly to their own work, and hence should strengthen their own positions with the public, their employees and the investor.

Pennsylvania Railroad Builds Three Experimental Locomotives

**One of These 200-Ton Engines Is for Freight Service on Alternating Current and the Other Two for Passenger Service on Direct Current—
Motors and Mechanical Parts Are Identical to Give Interchangeability**

WITH the prospect of extensive main-line electrification, including that of the Altoona grade, before many years, the Pennsylvania Railroad placed in service in the spring of 1917 a split-phase locomotive of 4,000-hp. continuous rating. This locomotive was described in the *ELECTRIC RAILWAY JOURNAL* of June 9, 1917, page 1048. The war, government control of the railways, and other causes delayed the test of this locomotive, which is now in regular freight service between Philadelphia and Paoli.

The railroad has now designed another type of locomotive for freight service. As an experiment, it is planned to equip the same locomotive for high-speed passenger service simply by changing the gear ratio and control devices.

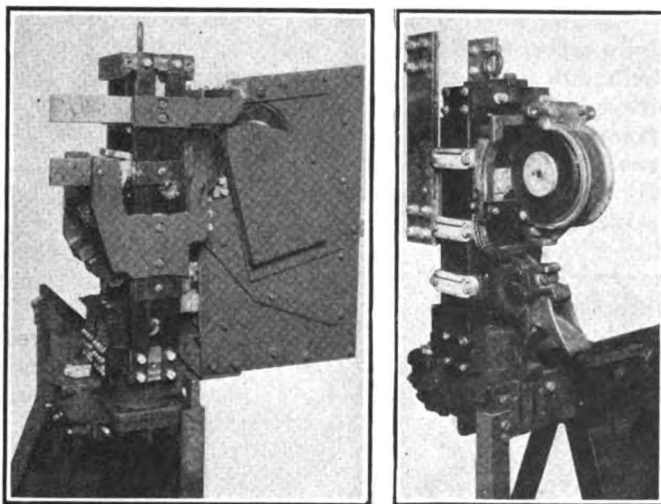
At the company's Altoona shops there are now being built three of these locomotives. The electrical parts have been supplied by the Westinghouse Electric & Manufacturing Company. One is to be used for freight service on the single-phase a.c. trolley, while the other two are to be given extensive tests to determine their adaptability for passenger service, after which it is proposed to use them as d.c. locomotives on the New York tunnel and terminal division of the railroad.

Each locomotive will weigh approximately 400,000 lb. and will be equipped with four single-phase commutator-type motors. These motors have a continuous rating on single phase of 760 hp., giving a total locomotive rating of 3,040 hp.

The locomotives have a 2-8-2 wheel arrangement and the so-called steeple-type cab construction. Two motors are connected to each of the two jackshafts. They are mounted outside, and at either end, of the driving wheelbase. Each jackshaft serves two pairs of drivers.

The single-phase freight locomotive will have a gear ratio of 30:118 and a maximum speed of 35 m.p.h. The two locomotives that are being arranged for d.c. passenger service over the New York tunnel and terminal division will have a gear ratio of 50:98, permitting a maximum speed of 70 m.p.h.

Although two of these locomotives are for d.c. operation, while the third is to operate on an a.c. contact

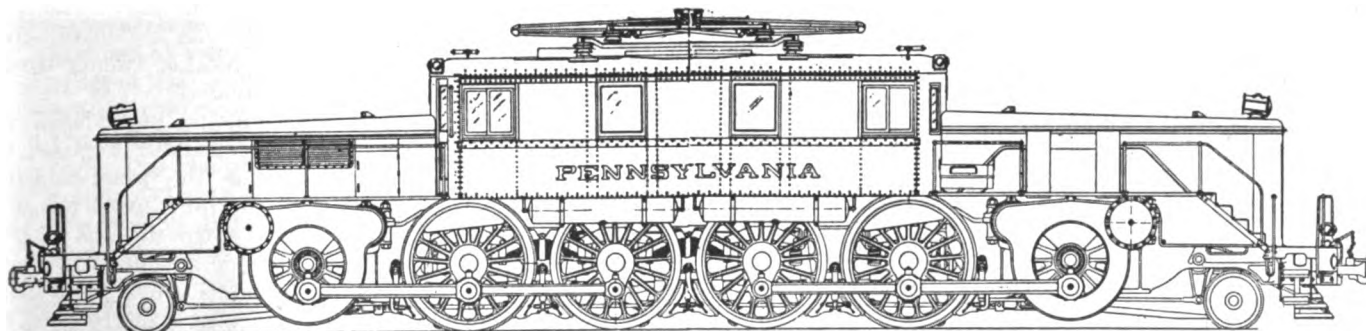


Electro-Pneumatic Unit Switches. At the Left, 3,000-Amp. Switch, of Which Twenty-one Are Used for Each D.C. Locomotive. At the Right, 1,500-Amp. Switch, of Which Twenty-one Are Used for the A.C. Locomotive

line, the motors and all other parts possible are being made identical. The space required for the transformer on the a.c. locomotive is devoted to accelerating resistance on the d.c. locomotive. The pantograph on the a.c. locomotive gives place to the third-rail shoe on the d.c. locomotive, etc.

Side rods will transmit power from the jackshaft to drivers. Flexibility between the motor armature and the running gear will be provided by springs set in the gear center, and flexible pinions in one of each pair of motors geared to their common jackshaft. These springs in the gear center and in the pinion, which are of the leaf type, have been especially devised by the Westinghouse company. They are inserted into their pockets without initial tension, and are so designed that they will be active throughout the operating range of the locomotives.

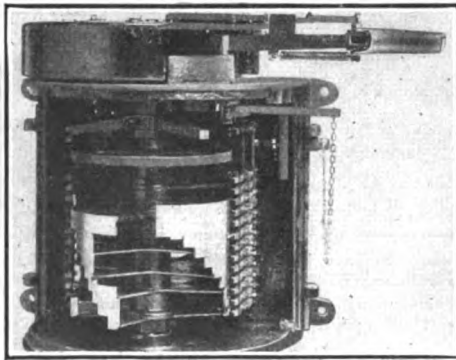
The outstanding feature of the a.c. freight locomotive is the traction motor, which has the largest capacity possible under the limitations prescribed by the



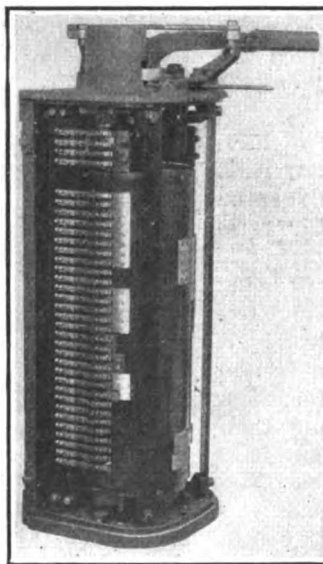
This 200-Ton Experimental Single-Phase Road Locomotive for Preferential Freight Service for the Pennsylvania Railroad Is Exactly Similar to the Passenger Locomotive

Pennsylvania Railroad, and incidentally the greatest capacity of any single-phase commutator type traction motor ever built in this country. The outside diameter of the frame is 76 in., while the motor is 43½ in. long. The main frame of the locomotive forms a cradle into which the motor is inserted, thus making the latter an integral part of the main frame. The motor bearings are carried on the locomotive side frames and are entirely separate from the main frame of the motor. In order to maintain the motor rating forced ventilation is employed. Air is drawn through the motors instead of being blown, as is customary.

Another novel feature is the use of an oil-insulated, force-cooled transformer. The transformer tank is built into the locomotive, but is entirely separate from the cab structure. Its base rests on pads on the main frame, while the top is formed by a portion of the cab roof. The sides of this tank are formed from a single sheet of steel, with a vertical riveted seam. The



The Master Controllers. Above, for the D.C. Locomotive; Center View, for the A.C. Locomotive



bottom is a cup-shaped piece set into the side sheets and riveted into place. The cover is made integral with the locomotive cab roof, so that the removal of the transformer core can be accomplished by simply removing that portion of the roof directly over the transformer.

The transformer oil will be cooled by being pumped through a forced-ventilated radiator.

The locomotive has three motor-driven blower sets. The one for the transformer has an oil-pump for circulating the oil, while the other two, one for each pair of traction motors, furnish air only. Otherwise the three are identical.

The traction motor control apparatus consists of a master controller, a reverser, the necessary unit switches for a notch-by-notch voltage increase to the normal voltage of the traction motors, preventive coils, and the minimum number of relays consistent with safety. A small motor-generator set is used for charging the control and lighting storage battery. The brake system is of the standard locomotive type. The brake lever system is designed for clasp brakes, giving 100 per cent braking power at the driving wheel. The above constitutes practically all of this very simple locomotive. The locomotive capacity is as follows:

	Continuous	Hourly
Tractive effort, pounds.....	50,000	62,000
Speed, miles per hour.....	23	19.75
Maximum tractive effort, pounds (at 33½ per cent adhesion)	..	100,000
Maximum speed, miles per hour.....	..	35

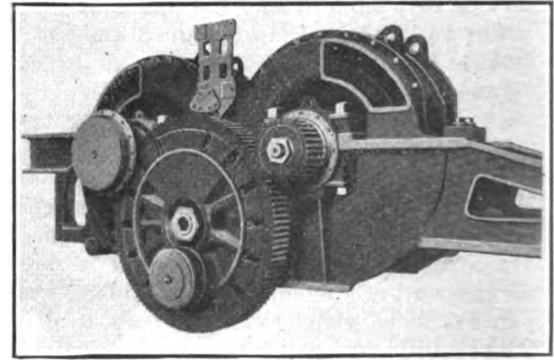
This means that the locomotive is capable of hauling 2,370 adjusted tons up the western slope of the Altoona grade at an approximate speed of 24 m.p.h.

The principal dimensions, which apply to both a.c. and d.c. locomotives, are as follows:

Distance between centers of each pair of drivers.....	7 ft. 5 in.
Distance between centers of jackshaft and nearest driving axle	8 ft. 2 in.
Driving wheelbase	22 ft. 3 in.
Total wheelbase	54 ft. 11 in.
Diameter of drivers	80 in.
Diameter of leading wheels.....	34 in.
Length over frame	63 ft. 8½ in.
Length, inside to inside of pulling knuckles.....	68 ft. 2½ in.
Height, rail to roof of cab.....	13 ft. 4 in.
Height, rail to top of pantograph when in lowered position.....	16 ft. 6½ in.

The passenger locomotives are of the same fundamental design as the freight locomotives just described.

They are intended for operation on the New York tunnel and terminal division, at 600 volts d.c., and are capable of handling the



Above, Two of the Large Single-Phase Motors Mounted in Cradle, Showing the Springs in the Gear Center

heaviest Pullman train entering or leaving the New York terminal.

The traction motors are identical with those used on the freight locomotive, and the blower sets are also duplicates. A number of parts on the electrical equipment required for d.c. operation which cannot be made duplicate of the parts on the a.c. engine have been made so as to duplicate parts on the present terminal locomotives. Among these parts may be mentioned the third rail shoes, resistance grids, etc. This will further aid in the ease with which the locomotives can be maintained, and should be a material factor in reducing maintenance costs.

The d.c. locomotives are being equipped with the largest unit switches in existence. These switches are of the standard Westinghouse electro-pneumatic type, and have a continuous capacity of 3,000 amp. The arc rupturing capacity of these switches on a 750-volt circuit is many times this figure. A total of twenty-three switches is required on each locomotive.

These locomotives will be completed and placed in service early this year, at which time it is proposed to make extensive tests to determine the practicability of this type of locomotive both for high-speed passenger and for freight service. If the expectations of the railroad officials are fulfilled, a great advance will have been accomplished in electric locomotive design by this adaptation of one type of locomotive to both freight and passenger service.

Reducing Noise in Train Operation

In an Extended Series of Tests the London Underground System Has Developed Methods of Preventing Noise from Entering the Cars—Sound-Absorbing Material Placed in Roof, Walls and Floor; Heavy Closed Windows, Special Ventilators and Shrouding of Trucks Are Principal Features Incorporated in New Cars

MUCH progress has been made by the Underground Electric Railways of London, Ltd., in its effort to reduce noise in the operation of trains. A surprising amount of research has been done, and while much remains to be accomplished, the amount of noise incident to the operation of underground trains has been reduced and the ear-piercing sounds have been eliminated.

The experiments have shown that it is not the loudest sounds which cause the most discomfort. Certain frequencies in vibrations are much more annoying. Since a large percentage of the noise comes from the truck, some engineers were of the opinion that the body of the car should be isolated as much as possible from the truck. This was tried, but it was demonstrated that the theory is unsound.

London's tube railways follow the deep blue clay stratum which underlies the city. Under the heart of the city the depth of the tubes varies from 20 to 180 ft. The tubes are driven easily because the clay can be cut with a knife and carries no water. Right-of-way is obtained without cost. The tube, however, is not much larger than the vehicles which pass through it. The noise has little chance to escape, and it is reflected from the walls against the cars.

In deep tubes great care must be exercised to prevent fire. A very little smoke is troublesome and causes great alarm among passengers. For that reason no inflammable material goes into the construction of the cars. The small amount of wood used in the strips on the floor is fireproofed carefully. This has limited the materials which could be used in reducing noise and has added greatly to the difficult work on the electrically propelled cars.

Another factor which has had to be taken into consideration in reducing noise is to do nothing which would promote corrosion. Since some of the materials used in the reduction of noise had that tendency, it was found necessary to overcome it by giving the steel sheets a lead bath. This procedure was found to be more than justified since the plating of lead stopped all corrosion which otherwise would be active in the atmospheric conditions such as exist the year around in the tubes. Another compensation for this treatment is the fact that it makes a splendid base for paint.

As a result of an extensive series of experiments, a number of features were incorporated in the new cars ordered for the tube railways tending materially to reduce the noise. One of the first things noticed in the tests made was that the windows, even when closed, were the passageways for the most intense of the sounds. This led to a material reduction in the size of the window and the use of glass $\frac{3}{4}$ in. thick. A narrow strip along the top of the window is made so that it may be opened when the train comes to the surface in the outlying sections. The guards on the train are careful to see that these openings are closed before the train

dives down again on its return trip. The ventilators are so constructed that they can be relied upon to furnish all the air needed, no matter to what extent the car is crowded. The air passing through the ventilators follows a circuitous course so that no direct path may be furnished for sound waves.

All sound boxes are eliminated. Wherever the design of the steel tends to form a box which catches and magnifies sound it is packed with mineral wool or some other non-inflammable substance to deaden the noise. The brake rods run on padding. The brake shoes are made of a composition of asbestos and rubber. Quilted asbestos is laid separating all contacts between steel. Layers of this quilted asbestos cover the entire roof and a $\frac{1}{2}$ -in. layer is placed between the top wooden wearing surface of the floor and the lower plate of steel. The entire car contains a layer of this asbestos, $\frac{1}{2}$ in. thick, on the inside of the body panels. The panel attachments are made with fiber or hard wood to reduce the continuity of vibration.

There has been long experimentation with tires for the car wheels made of soundless materials, but nothing has been found as yet which gives promise of replacing steel for that use. These experiments are continuing. Hope of their ultimate success has not been abandoned. If the noise arising from the contact between the rail and the steel tread of the wheel could be eliminated it is recognized that the principal cause of noise would be overcome.

Deflecting plates have been placed on the sole bar near the bogies to assist in preventing noise rising from them, and the trucks are shrouded with a leather skirt.

Much attention is given to the maintenance of the roadbed. By preserving exact levels much noise is obviated. Incidentally, it has been found very profitable to keep the roadbed in a high mechanical state of perfection, since it reduces greatly the wear and tear on equipment.

HOW THE NOISE WAS MEASURED

These noise-deadening features of the new cars were decided on as the result of an extended series of tests made under the direction of Prof. A. H. Low of the Low Engineering Company, Ltd. In the investigation it was found necessary to consider both causes and effects of the noises occurring in tube operation. The pitch was considered in addition to the total amount of noise, on account of its effect in interfering with conversation.

The intensity of the noises was measured by the use of an ingenious device consisting of a trumpet to catch the sound, and arranged so as to cause a diaphragm to vibrate. This vibration operated a mirror, causing a beam of light to play on a sensitized film, much like a reflecting galvanometer.

Almost the first records disclosed that the windows, even when closed, were the passageways for the most

intense of the sounds, but that by making them small and of extra thick glass the admission of sound could be reduced to a great extent.

One of the conclusions reached was that shrouding of the trucks was a great factor in reducing noise, as a large portion of the sound was generated by the contact of the metal wheels on the metal rails. The shrouding need not be great, but it should slope outward from top to bottom, should not have any air gaps and should be well stream-lined.

If air is not admitted direct, as through the windows, but the intakes are baffled properly, the noise is not seriously increased.

Damping of the panels was found of great advantage, but little difference was seen between felt and asbestos when they are not compressed under boards. Floor damping was not found so essential. For this purpose, however, loose material with a rubber foundation was determined to be the best.

RESULTS OF THE ENGINEERING INVESTIGATION

The following extracts from the original report of Dr. Low to the company cover the principal features investigated:

For practical purposes it is not possible mechanically to construct various parts to such limits as would avoid sounds of all kinds, when the source is so completely inclosed as in the average tube railway. It is, therefore, necessary to realize that all that can be done, while reducing the wave production as far as possible, is to insulate the passengers against excessive sound.

In cases such as are experienced in the tube railways there is usually a complete conflict of sound and noise, and the resulting oscillations of the atmosphere are such as to be without any definite wave slope. This renders it necessary to attend to every detail of sound, however apparently trifling. Total oscillation is reasonably easy to distinguish to the average ear, and therefore an audiometer of the damped diaphragm type is sufficient to measure total sounds and noise and to approximate the wave shape, with the ultimate object of tracing the sources and paths of the vibrations.

On the London Underground Electric Railways there is a general tone of noise which is very typical. On a photograph taken by the audiometer it was found to consist largely of two self-damped waves, occasionally beating together, but more often reflected after an original beat or resonance effect. This is quite clearly the result of one particular note undergoing reflection at different points of the containing tube's surface or support, and the use of a plain stethoscope confirms the opinion. This was checked by tapping a stationary carriage.

The floor does not reproduce the main note to any extent, and when damped with $\frac{1}{2}$ -in. asbestos no noticeable improvement is obtained. On the other hand, the roof, windows and sides, bare or covered, reproduce the exactly typical "tube roar" showing a far higher and more varying period than the floor. The floor vibration is quite slow. This was checked by a vibrometer. It was not to be expected that covering the walls would assist matters as much as an insulator, because no close contact can be obtained and the sound is reproduced and amplified via the air spaces, often in such a manner as to resound with the main noise. Opening the windows merely increases the main note, and by damping the air inlet or using ventilators separated by a sufficient distance to prevent direct sound connection, allow-

ing for car speed and windage, an improvement results, sound being comparatively slow in its movement.

The windows and ventilation openings cannot be conveniently doubled or blocked out. It is quite simple, however, to produce artificially, as by the movement of the train, a sufficiently high blast of wind to prevent effective sound transmission; also to rubber-insulate the windows and increase their actual rigidity by thickening the glass and adding double-padded posts.

The majority of the noise can be itself divided into three classes:

1. Wheel and rail shock.
2. General loose rattle.
3. Motor and gear noises.

These three individual wave forms are very much interdependent, and both original and resultant noises are blended and selected by reflection, resonance and reverberation.

The motor noise, type 3, is caused by the wheel jumping and consequent rock of the motor toe, with horn-plate movement, etc. Apparently better results may be obtained by using helical gears and impinging a jet of oil on the actual point of contact at entry. Insulation of the motor is important, but this class of noise, when transmitted, is of too high a periodicity to be objectionable at a later stage.

Noise wave, type 2, is due to many details which can be corrected with relative ease. Rubbing bars should be kept in permanent contact by flat intention springs. Axle boxes can be held to the horn-plates in the same manner, but, better still, a floating type of axle with radius rods would be simple, cheap, silent and easy of maintenance and lubrication. Looseness of the actual axle bearing is not in itself serious. All brake and car couplings can be held by springs, in order that the first operative movement will serve only to compress the spring and take up slack. No difference would be made in the working, and the blended noise rattle would be obviated, particularly if straight coupling could be adopted.

WHEEL AND RAIL SHOCK CAUSES MOST NOISE

Wave type 1, that of wheel and rail shock, is far the most serious source of irritation and is greatly aggravated by the formation of both longitudinal and transverse vibrations within the tube itself. The particular form of damped oscillation produced is of low frequency, and it is so irregular that it is capable of resounding and combining with notes and noises of pitches varying over a wide range. In consequence, the slightest rail vibration, excluding rattles, is communicated to the "rolling wave" and produces recurrent reverberation and resonance.

To illustrate this point an experiment has been conducted with a plain reflection tube of 3 in. diameter and 3 ft. long. When such a tube is struck by a hammer or a ball rolled down its length a distinct "tube" rumble is obtained. This disposes of the suggestion that local windage obtained by drilling the main girders, or that the motor or other self-contained noises on the train can possibly produce the chief resonance which is so objectionable. If the tube model is struck centrally by a hammer a node is formed at some distance, and the same may apply to the rail itself, which, magnified, presents a series of serrations.

From this and other experiments with the model tube Professor Low draws the conclusion that if the speed of sound in the tube is compared with the speed of travel,

at fairly high speeds the roar can easily be due to a beat between the roof and the tube-reflected sound and the wheel roll.

It has already been proved by a stethoscope that the floor and lower sides do not transmit much noise. Dampening the floor with asbestos gives little improvement, and yet if windows and ventilators are closed there is a vast improvement from the addition of packing.

If in the prepared carriage a bay is left uncovered, the noise from the sides is not much greater when in contact, but at the center of the carriage the noise is far worse. On the contrary, if the roof and all sides are covered a still greater improvement takes place.

Unless the air pressure falls rapidly enough to break the wave, it is noticeable that except at such points the station gaps do not cure the sound, though with shrouded bogies the reflection time is greater and consequently the improvement is disproportionately increased. This suggests that if the lower wheel-carrying portions could be fitted closer to the tube by the interposition of some anti-vibratory substance, and by some attachment of high natural frequency, the noise could be reflected forward or backward, so that less resonance would occur. This would not reduce the apparent sound volume, except to a passenger in the car. The same reasoning applies to air ventilation, which should clearly never be direct. The ventilators should be louvred heavily. By means of shattered air scoops ventilation could be had through windows operated by the passengers, and as long as direct connection is avoided there will be no singing of the air in resonance with the main note.

The air pressure due to the rapid motion of the train can be utilized as a screen, and at the same time the effective length of the air column under the influence of the train should be reduced by stream-lining the sides and end of the train, in order that the natural period of this air column may be increased beyond the oscillatory period.

BREAKING UP SOUND WAVES ESSENTIAL

As a definite conclusion it will be seen from an audiometer photograph representing the noise with all parts padded and doors closed, but without shrouding, that closing of the doors has a great silencing effect. This is borne out by the marked increase of noise from an unprotected bay of seats and from the reduction of noise by closing the ventilators, so that no short sound path is available. During this "noise photograph" the car was inclosed almost completely in asbestos covering, but only the sides and the roof really needed protection. No single wave was produced, proving conclusively that the recurrent beat from the vibrating sides and the wheel roll caused the trouble.

There is no reason why a car should not be solidly built with cork or asbestos padding fireproofed and inserted tightly between the double walls. Rattles can easily be prevented by solid construction of running gear; ventilators can be made indirect; doors can fit well, and windows can be thickened and held in thick rubber insertion. Heavier gangway partitions would follow as a matter of course. If fiber centers or complete fiber wheels cannot be adopted, the wheels can be made less liable to jump and chatter by altering the period of the supporting spring. Considerable lengthening is most desirable, as also is proper spring lubrication.

That the wheels are far from steady, even on a good road, is made very clear when the ultra-rapid cinema

points are measured up. The wheel is not maintained in proper resultant position by the present loose method of carrying, and its lifting periodicity does not vary greatly from the oscillatory period of the general noise wave as shown by the audiometer.

The rail fastenings are of great importance when in an atmosphere rather higher in pressure than that to which the passengers' ears have been accustomed. This tends to assist the sound to travel, unless the air is impeded by deflectors and sheaths to obtain the correct reflection. Packing up the rail track to reduce actual rail noise is fairly effective, but insulation from and the avoidance of resonance are the two points of greatest importance from the aspect of the traveler.

METHODS PROPOSED TO REDUCE NOISE

The things that should be done in order to reduce the noise due to train movement, as developed in the tests, are summarized below in a list of practical suggestions:

1. The track should be packed as high as possible with fine ballast.
2. Fishplates and rail couplings should receive attention.
3. The whole of the brake and coupling gear should be fitted with flat intention springs, including rubbing blocks.
4. All doors, gates and trellis couplings should be held on ball catches which take up wear.
5. Fiber or fiber-supported car wheels are advantageous.
6. Carriage springs should be increased in length and lubricated by inclosure if possible.
7. Motor gears should be lubricated by a directly applied oil jet under pressure.
8. The lower part of carriages should be stayed in both directions, particularly where the girder surrounds the wheels.
9. The sides, roof and doors of carriages should be stiff and double. The entire space should be packed with cork powder, slag wool or asbestos compound. This point is of paramount importance.
10. The window ventilators should not open and louvres should be fitted with wind deflectors outside, and not opposite to the entrances.
11. The carriages should be stream-lined as far as possible and the space between them sheathed in with leather supported in trellis couplings. Both ends of the train should be fitted with wind-cutting ends, or the carriage ends should be made more curved.
12. Windows should be slightly reduced in size, increased in thickness, and held in rubber insertion at least $\frac{1}{8}$ in. thick.
13. All loose chains and wires between carriages should be spring-held and covered with cloth bagging.
14. Wheel bearing play should be reduced if possible and a torque rod system substituted. The brakes need not then hang on one bar, which is bound to cause chatter in one direction. Brake shoes should not be in one piece, and two units should be fitted to increase the chatter period.
15. The wheels and all parts below the stepboard should be heavily shrouded to deflect the sound, and as far as possible each wheel should be well shrouded with a small wind scoop arranged on the leading edge. This was found extremely effective in practice.
16. If possible, a minimum of actual wheel should be visible in elevation. The shrouds should be of a heavy substance of very high natural period, such as malleable

cast iron lined with fiber. It is important to insulate the lower parts altogether.

17. The insulation of motors, etc., by mounting on fiber is almost useless. The noise is wheel rolling reflected from the tube sides, which beating inside, with the window carriage side and roof vibration, mixes with the resonance externally produced by the entire combination of sounds and noises.

18. Larger wheels might be fitted on some cars.

19. Where wood is used an improvement is noticeable; metal supports should never be attached at one point only. The wooden car note is slightly lower in pitch and of less varying amplitude. This renders the sound less objectionable in character, but apart from this fact the improvement is not great.

20. Cross seats are a slight advantage in preventing a long fixed air column to vibrate.

21. Motor armatures should be balanced accurately to eliminate excessive vibration.

In a final set of experiments triplex windows were used with padded center posts to break up the large dimensions.

The results were very satisfactory, particularly when the glass was partially covered by a small piece of paper.

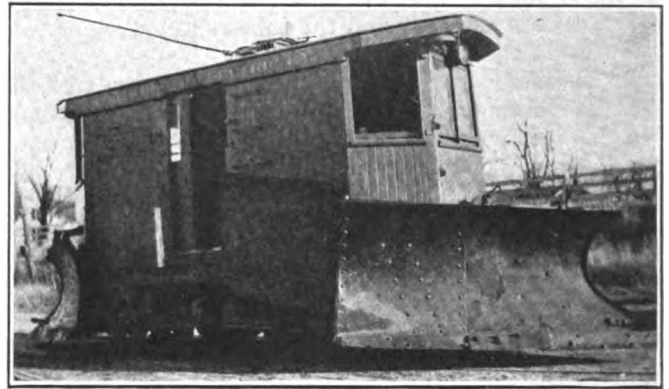
The joints of doors were also carefully fitted. An appreciable reduction of noise is obtained by shrouding alone. To obtain proper results from shrouding, roof padding is needed, as the object is chiefly a reduction of resonance.

For this reason shrouding does not reduce the apparent noise to any one outside the carriage.

It Pays to Send Out the Snow Plows Promptly

How the Portsmouth Electric Railway Keeps Its Line Open in Winter Despite Heavy Snows—Low Rail in Open Country Increases Difficulty of the Task—Taunton Plow Has Special Nose

THE winter of 1922-1923 was one of the most severe that has visited New England in many years. Between Dec. 1 and March 1 nearly 100 in. of snow fell, and as there was no protracted period of thawing the depth of snow on the ground kept increasing until it was piled alongside the tracks of the Portsmouth Electric Railway as high as the roofs of the cars. On March 7 there was a snowfall of about 6 in., driven by a 40-mile gale. The snow piled into the cuts to such an extent that it was impossible for the plow to throw



This Snow Plow Is Equipped with an Adjustable Wing Which May Be Swung in Where the Clearance Is Small

it over the top of the bank, and the line had to be cleared by shoveling. In spite of such severe conditions as these, however, the railway was successful in keeping its lines open all winter. The policy of sending out the snow plows promptly when the snow began to fall and keeping them out until the storm ended is thought to have been responsible for this success.

The Portsmouth Electric Railway operates two lines in the city of Portsmouth, N. H., and an interurban line from Portsmouth to Rye, Rye Beach and North Hampton, connecting at the latter point with the Exeter, Hampton & Amesbury Railway. One of the difficulties with which the railway has to contend in winter storms is the fact that much of the line in the open country is built with low rail. The snow-fighting equipment consists of two Wason 15-ton plows and one Taunton 18-ton plow. The Taunton plow is equipped with a special nose, as shown in the accompanying illustration, and is ordinarily assigned to the interurban line. One Wason plow takes care of about 7 miles of city track. The third plow is for emergency and is not used unless one of the two others becomes crippled or in case the storm is so severe that two plows are insufficient to keep the lines open.

A crew of four men is used on each of the Wason plows and a crew of three men on the Taunton plow. These men come from all departments of the railway. For example, a typical plow crew consists of one trainman, one shopman, one trackman and one lineman. As each man has his part to do they always go out together in the same crew. This has been found to be the best practice. As soon as a storm begins the snow-fighting crews are assembled, although this is done beforehand if advance notice has been received from the weather bureau.



In the Cuts the Plows Could Not Throw the Snow Over the Accumulated Piles



Nearly 100 In. of Snow Fell in Portsmouth During December, January and February Last Year

How to Secure Better Public Relations

**Bad Treatment of Utility Corporations Results from Personal Grievances of Customers—
Public Relations Committee Should Make Company Better Understood—Its Manager
Should Take Active Part in Civic Affairs—Correct Attitude of Employees
Important—Securities Should Have Wide Distribution Locally**

By E. C. Hathaway

Chairman of the Board, Railway Audit & Inspection Company,
Formerly Vice-President and General Manager Norfolk & Portsmouth Traction Company, Norfolk, Va.

WITH the growth of commissions, many railroad men feel that there are marked socialistic governmental tendencies in this country at present and that a large portion of the public favors municipal ownership and operation of utility corporations. This is a point upon which I take issue.

In the first place, the average American is always ready to exercise his prerogative of criticising those conditions which do not suit him. The utility corporations are usually in the front line trenches and so are apt to receive the shot first. This does not mean that there is any inherent prejudice against the corporations as such. The criticism they have to bear comes from their impersonal character. Any person who criticises his local railway, lighting and power company or gas company knows that, except in an impersonal way, it is utterly impossible for the corporation to defend itself. It is almost unknown to have a customer of a large dry goods store or other business rush into public print to tell how badly he has been treated in a business way either by that store or its employees. This, I take it, constitutes the fundamental difference between the two attitudes of the public.

In many cities the wholesale and retail business concerns do more business annually than any one of the utilities, but the critical customer has always the privilege, if he is dissatisfied, of patronizing some other concern in the same line of business. This is not possible with the utilities, which are natural monopolies, so that the customer has to accept conditions as they are or go after the corporation in whatever manner seems likely to be the most effective to him.

MANY CRITICS HAVE PERSONAL GRIEVANCES

I have personally investigated a great many of these criticisms of public service corporations and have found, in the last analysis, that the cause was nearly always bad treatment of the critic by some employee of the corporation. This shows the necessity of instilling into all employees who come in contact with the public the need of keeping the customer satisfied. It matters little whether the monthly bill is \$1.50 or \$500. The principle involved is the same in all cases. Often-times an individual of small caliber will make it exceedingly difficult for the management to do business with either the council or the corporation commission, as the case may be. It is important to have the employees of a public utility company realize that the sale of its service is purely a commercial proposition, and it is as vital to make the customer feel he is being treated with proper consideration as in the case of the retail merchant.

The cities in which utilities operate are naturally

divided into two classes. The first is the medium-sized city, in which the general manager of the utility is practically on hand-shaking terms with the vast majority of his customers. The second is the city where it is impossible for this personal relation to exist. In the latter case it becomes necessary for the corporation to create a practical contact with the public that will inure to its benefit, so far as personal relations are concerned. A move which I strongly favor is to create from the board of directors a "public relations committee," this committee to be represented by a man who is not only willing but enthusiastic to present the company side of the case and with a natural flair for making friends.

This has been done to a great extent in the past, but the men engaged for the service have been paid inadequate salaries and their function, it was presumed, was either to get favorable publicity from the newspaper people or to be able to damp criticism in such papers should it exist. This is wrong.

QUALIFICATIONS OF THE PUBLIC RELATIONS MANAGER

Primarily, the man should be selected with a full knowledge of his personal characteristics. He should be a fluent and ready speaker. His duty should be to identify himself with every public movement, and he ought not to feel himself too important to go out and address a meeting of twenty people, if it were necessary, or five hundred if the opportunity should present itself. He should have the proper sort of an office, with adequate space. All complaints of whatever character should be delivered to his office, and it would be up to him to study and analyze these complaints, find out whether they are merely the result of some small difficulty and, if so, be in a position promptly and definitely to adjust the situation after the responsibility has been fixed. He should be a member of the leading clubs of the city, social, business or otherwise, and he should be expected not only to identify himself with these clubs but to attend carefully all the meetings so that he would be in a position to forestall or explain any shortcomings of the company, whether they are real or fancied. Finally and unquestionably, he should receive the fullest confidence and support of the operating management. Some of the keenest operators of public utilities in the United States, men who can secure results, who are economists to the highest degree, ought never to be permitted to come in contact with the public or to plead the company's cause with the people, because their general trend of mind and reasoning are such as to unfit them for small adjustments, and they are naturally not diplomats.

In the creation of such a department it might be a

trifle difficult at first to bring about the proper and whole-souled touch between the public and the operating management, but this can be done if the conditions are fairly met and the results will be beyond the most sanguine expectations. It may be said that this has been done in a way in the past, but in many cases the men picked have not been of a caliber large enough to impress themselves upon the public. The plan proposed is entirely within the range of possibility and, once properly launched, the supposed socialistic attitude of the public at large will be discovered to be a myth and not an inherent antagonistic attitude toward corporate interests.

After all, if we may be permitted to use an advertising term, it means not only to sell the service to the public but to sell the management as well, and this may easily be done if the proper ability, time and thought are devoted to the subject.

If we dip for a moment into what seems to be ancient history, the writer can remember the time when Mr. Rockefeller was perhaps the most execrated man in the United States. He, and his company as well, was always under fire both by the press and the public. Ultimately, he saw the necessity of being what might be called properly press agented. He has given freely of his money, of his time, and of the best minds and professional skill that he could engage to promote the general health and welfare of the people in the United States. Had he accomplished nothing more than the discovery of the hookworm and the simple remedial agencies that would wipe it out he would not have lived in vain. Millions in brains, brawn and activity have been added to the South by the researches of Rockefeller Institute, which has been so generously supported by him. In the intervening years, the kindly feeling for Mr. Rockefeller has grown to the point where he may justly be said to be one of the most popular ultra rich men in the United States. Even the effect on the Standard Oil Company has been to bring about a feeling that, while it is to a considerable extent a monopoly, in all probability this condition is preferable to an open market operated by cut-throat methods.

Public utilities when started years ago were usually backed by local capital and managed by local people. The increase in the population of the country, coupled with the ever-widening demand for this service, soon brought about a condition where the organizers had not the money-raising ability to provide for their growth and future needs. They were sold—at a good profit to be sure—to the banking interests of the country, out of which grew a coterie of bankers whose specialty and business it was to purchase and operate these utilities. The banking interests, shortsightedly, did not recognize the necessity of building up local interests by every legitimate means at their command, and especially by the sale of guaranteed preferred stock or bonds upon terms and at prices which would be attractive to the local investing public. They also neglected to cultivate the good will of the local interests, and, pushed to its logical conclusion, this condition brought about a revolt against what might be termed "Absentee Landlordism."

EMPLOYEES AND STOCKHOLDERS CAN HELP

Having made clear the writer's idea of the necessity for and the caliber of the representative of the public relations committee, we come to the question of contact with the public through the medium of employees whose duties lie in this direction. Practically every young

manager in the business in the last ten or fifteen years has prepared for himself and read before the association at its various meetings an article covering the necessity for courtesy on the part of these employees from the humblest position up. It is a self-evident proposition on which too much stress cannot be laid, but its operation is a managerial function. It must come from the officers directly connected with the operation of the property to whom these men are subordinate. It is just as important now as it ever has been, and nothing is to be gained by dwelling on this subject.

Next in line come local interests in public utilities. The up-to-date banker of to-day has reached the conclusion that the local public should absorb at least 60 per cent of the indebtedness of the company in the shape of guaranteed preferred stock. This stock can and will be absorbed by the public providing the proposition is properly presented and the wisdom of this investment made clear. In the opinion of the writer, it should be sold in smaller units per share than it now is, the par value running from \$10 to \$50 per share instead of \$100, which is the popular par value.

The interest developed by the ownership of this guaranteed preferred stock will be much greater than that developed by the ownership of common stock as in the past and, if anything like the percentage above mentioned can be placed at home, a bulwark protecting the company from outside aggression will be erected, which is going to make the politician and the corporation baiter think twice before precipitating a fight.

It will be no trouble to get these stockholders to go to the public meetings, prepared not only to talk for but to fight for what they conceive and what are really their personal rights in the premises.

CONCLUSIONS

Therefore, in the order of their importance, we may summarize the new development as follows:

1. Public relations committee from the board of directors and chairman thereof.
2. The fullest distribution possible of the company's securities in the shape of preferred stock, making the par value so low that any consumer may become a stockholder if he so wills.
3. The fullest education of the employee who comes in contact with the public of his importance to the company's interests, what his attitude means and how his efforts may be capitalized so that they may be of service to and an asset for the company.

Competition in Reduction of Accidents

THE Boston Elevated Railway has posted at various points on the system, where they can be watched by employees, graphic representations of increases or decreases in industrial accidents on the property. These accidents are grouped into four departments—transportation, shop, maintenance and power. The representation is in the form of a racetrack, with horses to represent each of the departments, but the comparison will be within each department, as there is no connection between two departments.

It is hoped that this graphic method showing the record of each department against that of the year previous will create interest and concentrate attention upon the need of all employees and supervisors to watch industrial accidents constantly, so that they may be gradually reduced.

Public Decides Upon Color for Street Cars

IN FORT WORTH the one-man safety cars of the Northern Texas Traction Company were formerly painted palmetto green. But in order to make the cars more visible, and also to make them more attractive, the company decided upon the use of yellow for the car exterior. Several cars were painted in different color schemes and the public was asked to decide upon the one to be adopted permanently.

The three principal color combinations in this experiment were as follows: (1) Trucks, black; side sheeting and dash up to the window rail, dark orange; from the window rail up to the roof, ivory; trimmings and numbers, black. (2) Trucks, black; body up to the roof, dark orange; window sash and doors, ivory; trimmings and letters, black. (3) Trucks, black; body up to the roof, cadmium yellow; doors, trimmings and numbers, red.

Comments upon these color schemes were many, but the general opinion of the public, as well as that of the company, favored the third. This has therefore been adopted as standard for all one-man cars. Two-man cars are painted lemon yellow, and no change in this arrangement is contemplated. Changing the color of the safety cars and inviting the public to comment upon the various schemes attracted much favorable attention to the railway.

The Readers' Forum

Substantial Encouragement in "Journal" Statistics

PUBLIC UTILITIES ADVERTISING ASSOCIATION

PORTLAND, ORE., Jan. 16, 1924.

To the Editors:

You men on the JOURNAL, who prepared the Annual Statistical Number, are to be warmly congratulated for the splendid publication you issued. Not the least important part of that publication is the substantial encouragement it should give to the men who are studying the trend of things in the industry. There is much information in that issue to offer encouragement to carry on vigorously through the coming year.

W. P. STRANDBORG,
President.

How Plan to Publish Railway Bus Matter in "Journal" Is Viewed

FURTHER letters from other sections of the country which have come in in response to a request for an expression of view on the new policy of publishing railway bus articles in the JOURNAL follow. This policy was set forth in the editorial on page 3 of the Jan. 5 issue of ELECTRIC RAILWAY JOURNAL. Other letters commenting on the plan were published last week on pages 108 and 109.

INDIANAPOLIS STREET RAILWAY

INDIANAPOLIS, IND., Jan. 17, 1924.

To the Editors:

My idea is that bus articles appearing in ELECTRIC RAILWAY JOURNAL which give the experience of the street railway companies in the operation of buses would

be of very considerable interest to the street railway fraternity throughout the entire country. I think we are all anxious to learn from the experience of street railway companies which have actually tried out bus operation just what results can be definitely counted upon.

ROBERT I. TODD,
President.

HENRY L. DOHERTY & COMPANY

NEW YORK, N. Y., Jan. 21, 1924.

To the Editors:

Replying to your telegram of the 14th relative to the policy of the ELECTRIC RAILWAY JOURNAL publishing bus articles, I feel that this is entirely in keeping with the progressiveness of your publication, as the tendency today is for co-ordinated transportation service in cities.

As you are aware, it is my thought that the electric railway is here for a great many years to come, but there are places where auxiliary service can be furnished by buses, and this should be done by the present railway operating company.

F. R. COATES.

UNION TRACTION COMPANY OF INDIANA

ANDERSON, IND., Jan. 17, 1924.

To the Editors:

Answering your wire of the 14th inst., I am glad to know that the ELECTRIC RAILWAY JOURNAL intends to devote more attention to the operation of motor buses by electric lines. There is no question that motor buses have their place in electric railway operation. The subject is therefore one concerning which the electric railway industry may expect full treatment in the pages of the JOURNAL.

ARTHUR W. BRADY,
President.

THE KANSAS CITY RAILWAYS COMPANY

KANSAS CITY, MO., Jan. 21, 1924.

To the Editors:

I have your inquiry of Jan. 14 in regard to the policy of the JOURNAL as announced in an editorial in the Jan. 5 issue relative to publishing bus information in the JOURNAL.

I see no reason why those interested in the operation of street railway properties should not have the opportunity of being advised of what occurs in the bus field, and I know of no better medium for such information than the JOURNAL.

I think it is a generally accepted fact at the present time by street railway operators, legitimate manufacturers, and, in many communities, public officials and the public, that for the maximum good of all parties interested transportation is a monopoly and that co-ordination is essential as against competition and duplication. Street railway operators are now taking advantage of the bus and co-ordinating it with existing street railway service, in many cases at an operating loss, on the principle that it is their obligation fully to serve their community. Bus news, because of the above facts, is street railway news at the present time, and just because the ostrich, by sticking his head in the sand, ignored and denied the existence of some unpleasant circumstance would hardly be justification for any of us to follow the same course. Personally, I prefer to get my reading covering the street railway field from the recognized street railway journals, and I am of the opinion that the position taken in your editorial will meet with general approval.

I think there is a danger in certain bus propaganda

now being broadcast. I am also of the opinion that there is more or less of a definite connection between certain bus interests and the activities of political lawyers in certain communities in applying for and asking for bus permits and franchises. I am not very favorable to this method any more than I would be if a car company, in order to sell its product, would attempt to establish street railway competition through any means. I am also convinced that the street railway industry will very soon find out those manufacturers of buses and bus parts who are sincerely interested in doing business with existing transportation companies, and who would frown upon any attempt to force bus installations through other than such legitimate means.

The policy as expressed in your editorial, to my mind, is a sound one.

F. G. BUFFE,

General Manager for the Receivers.

INTERSTATE PUBLIC SERVICE COMPANY, INC.

INDIANAPOLIS, IND., Jan. 16, 1924.

To the Editors:

I firmly believe that the bus has its proper place in the transportation world, not as a competitor, but as a feeder to the present street and interurban transportation agencies.

While I have never changed my opinion that the bus operators should not be allowed membership in our association, yet I feel that we cannot have too much information at our command with reference to what is going on in the bus transportation field, and therefore I feel that bus articles, stating facts as you find them, published in the JOURNAL, should be an advantage to us.

HARRY REID,

President.

THE BROOKLYN CITY RAILROAD COMPANY

BROOKLYN, N. Y., Jan. 23, 1924.

To the Editors:

I heartily concur in your change of policy as expressed in your editorial of Jan. 5 relative to publishing in the JOURNAL information covering railway operation of buses.

I appreciate being able to keep in touch with results of any bus operation by railway companies through the ELECTRIC RAILWAY JOURNAL, which should cover the transportation field in all its phases.

C. E. MORGAN,

Vice-President and General Manager.

CHICAGO SURFACE LINES

CHICAGO, Jan. 17, 1924.

To the Editors:

I have read with a great deal of interest the editorial and the special article in your issue of Jan. 5, 1924, on the subject of the bus in the railway field, and I believe the suggestion that your paper should treat comprehensively the activities of railways in taking up the bus is a step in the right direction. The alert electric railway operator of today should endeavor to keep pace with all developments in the transportation field in order to look after the interests of the people he is employed to serve. Transportation requirements of any community can best be furnished by one agency, and that agency should be the electric railway organization.

Your paper has always kept pace with developments in transportation. It is entirely consistent, therefore, that it should still further broaden its scope by pub-

lishing bus articles so that readers may know what developments are going on in this latest form of local transportation. The rapid expansion of electric railways into the bus field in the past few years should impress the railway operators with a desire at least to know how these pioneering companies will work out their co-ordinated facilities. The JOURNAL can serve a useful purpose in bringing such facts to their attention.

G. A. RICHARDSON,

Vice-President.

GEORGIA RAILWAY & POWER COMPANY

ATLANTA, GA., Jan. 17, 1924.

To the Editors:

I note in the Jan. 5 issue of the ELECTRIC RAILWAY JOURNAL that railway operation of buses is to be covered in the JOURNAL. This is, in my opinion, a very good move on the part of the JOURNAL, because the railway industry is vitally interested in the operation of buses.

I personally feel that the street railways will, in a very short time, adopt operation of buses, to the exclusion of outside interests, because the matter of transportation is a natural monopoly, and if the people are better served by buses than with street railways, under certain circumstances the bus should be operated and controlled by the street railway companies. Any information that the JOURNAL is able to gather on the operation and maintenance of buses will be of untold value to the street railway industry—particularly to those who are operating buses.

We are not now operating any buses, but we have made certain investigations, and I believe that in time we will do so.

F. L. BUTLER,

Vice-President and General Operating Manager.

THE DENVER TRAMWAY COMPANY

DENVER, COL., Jan. 19, 1924.

To the Editors:

The trend of the times indicates that we are rapidly becoming transportation men in a broader sense than ever before and that bus service, to a certain extent, is squeezing into the electric railway field.

With 121 street railway companies operating 1,207 buses over more than 1,500 miles of bus routes, and these figures growing rapidly every day, the street car man is sound asleep who cannot see that buses are a steadily increasing factor in city transportation.

Your editorial, page 3, and subsequent summary, page 5, of the Jan. 5, 1924, ELECTRIC RAILWAY JOURNAL makes this very plain. The columns of the ELECTRIC RAILWAY JOURNAL without question should carry all bus matters pertaining to the economics of city transportation.

Companies facing expensive track and paving reconstruction jobs will do well to consider bus operation seriously before buying new ties and steel and signing up paving contracts.

Bus manufacturers should be pressed to join the manufacturer member ranks of the A.E.R.A. Many street railway executives consulted in the past three months are firmly of the belief that buses can properly provide all the transportation requirements of cities under 60,000 population and we know that street railway managements in a number of towns have retired rolling stock, removed tracks, wires and poles and in their stead substituted buses.

EDWARD A. WEST,

General Superintendent.

Association News & Discussions

Automotive Vehicles and the Electric Railway

Methods of Utilizing Bus and Motor Truck as Auxiliaries and Prevention of Automobile Accidents Were Chief Subjects of Discussion at Meeting of the New York Electric Railway Association

A PAPER by William P. Kennedy, president Kennedy Engineering Corporation, on "The Motor Bus—Keynote of Expansion for Street Railways," was the feature of the morning session of the Midwinter Meeting of the New York Electric Railway Association, held at the Hotel Commodore, New York City, on Jan. 24. An abstract of the paper appears elsewhere in this issue. Following Mr. Kennedy, E. H. Lamburger, general engineer Westinghouse Electric & Manufacturing Company, discussed briefly some of the problems of design of gasoline and trolley buses. He said that in general trolley buses were the more economical to operate. Some of the engineering difficulties encountered in design were also described.

Experience of his company with buses were given by L. S. Storrs, president the Connecticut Company. Mr. Storrs said that he thought the attitude of railway men toward the bus had recently been undergoing a change. At one time manufacturers of automotive equipment were claiming so much for the automobile and giving so little credit to the electric railway as a transportation medium that railway men were forced in self-defense to claim everything for their own method of transportation and disparage the bus. Now, however, this situation no longer exists, and railway men are beginning to look with more favor upon the bus as an auxiliary. According to Mr. Storrs, automotive men have begun to realize that technical skill is required for successful bus operation, and that electric railway men are peculiarly fitted to handle the transportation problems arising therefrom.

Mr. Storrs said that when many existing railway lines were laid out it was not possible to foresee the exact directions of community growth, and hence there now are sections where adequate railway service is not available. The first use for the bus is in such territory. Another good way for railways to avail themselves of this vehicle is in the establishment of crosstown routes to provide service which has long been looked upon as necessary, but where the demand did not justify laying track. The use of the bus in de luxe service on routes paralleling existing railway lines

should not be attempted until after these other needs are fulfilled. A responsible railway cannot, like an individual bus owner, abandon a route because it becomes unprofitable. Having once undertaken to operate a certain line the railway is obliged to continue it, and great care should therefore be taken not to establish a bus route that may become a burden rather than an asset.

C. R. Barnes, City Commissioner, Rochester, spoke briefly concerning the installation of the trolley bus in that city. Efforts made to improve the design of trolley buses were described by E. C. Bull, vice-president Brockway Motor Truck Corporation.

The meeting was presided over by Vice-President Morgan, as President Duffey was unable to be present owing to the serious illness of a member of his family. Mr. Morgan appointed W. J. Harvie and T. C. Cherry as a committee to draft a telegram expressing the sympathy of the association to Mr. Duffey.

After saying that the industry was now beginning to see daylight, Mr. Morgan introduced Bertram Berry of the Heywood-Wakefield Company as the first speaker, who presented a paper on "Production of Rattan and Its Uses." An abstract of this paper is given in this issue on page 163.

PROGRESS OF ACCOUNTING DESCRIBED

The progress of the accounting committee of the New York Electric Railway Association was told by E. H. Reed, auditor Brooklyn City Railroad. During the past year this committee has discussed numerous subjects, among them being that of a uniform system of sub-accounts for use in the monthly operating report. This will be of benefit to railway officials in making comparisons with other roads. Although all railways prepare reports in accordance with the uniform system of accounts as prescribed by the Public Service Commission wide variations in sub-accounts have been found. In fact, the practices of no two companies were found sufficiently alike to permit of informative comparisons. It is the belief of the committee that uniformity in the classification of accounts as prescribed by what are commonly known as the

"up-state" and "down-state" commissions would benefit the utilities as well as the commissions themselves. J. M. Joel, general auditor of the New York State Railways, Rochester, also spoke briefly.

A paper on the prevention of automobile accidents was presented by J. J. Sharkey, claim agent New York State Railways, Rochester. An abstract appears elsewhere in this issue. In the discussion following Mr. Sharkey's paper, William Farrell, Utility Mutual Insurance Company, expressed doubt as to the advantage of compulsory automobile insurance, since this might encourage recklessness on the part of the automobile driver. The systematic use of posters is valuable, in the opinion of R. S. Messenger, claim agent Rochester & Syracuse Railroad. C. E. Morgan, vice-president and general manager Brooklyn City Railroad, told of the effect in reducing accidents of the bright colored designs painted on the dashboards of his company's new cars. The importance of this was emphasized again by Mr. Messenger, who said that his company had obtained good results by changing the exterior color of the cars from green to traction orange.

The decrease in automobile fatalities in Massachusetts, Connecticut and Maryland resulting from motor vehicle laws "with teeth" was brought out by A. T. Davison, general counsel Third Avenue Railway. L. H. Palmer, vice-president and general manager United Railways & Electric Company, Baltimore, and J. E. Hewes, vice-president and general manager Albany Southern Railroad, also spoke.

An interesting experiment being tried by the United Traction Company, Albany, was described by H. B. Weatherwax, vice-president. He said that his company had made an arrangement with an insurance company to insure the railway against all claims and damages. The premium to be paid is 5½ per cent of the gross revenue on the city lines, and 3½ per cent on inter-urban lines. All the claims investigation and legal work is done by the insurance company, but the railway retains entire disciplinary control of its trainmen.

MOTOR TRUCK FREIGHT TRANSPORTATION

At the afternoon session a paper on unregulated motor truck freight transportation was presented by F. E. Watts, general freight agent New York State Railways. An abstract of this paper will appear in a future issue.

In a written discussion H. C. Stanton, general freight and passenger agent Rochester & Syracuse Railroad

and Empire State Railroad, Syracuse, spoke of motor truck freight lines that have been established to compete with the electric railways. These lines can give serious competition on account of less overhead, less cost for equipment, no maintenance of roadbed, and no state supervision, he said. The motor vehicle is of unquestioned value, and organized truck lines can relieve the railways of uneconomical service; but they should abandon their efforts to handle general traffic in competition with the railways. Immediate steps should be taken to place motor truck carriers in New York State under the regulation of the Public Service Commission, and that body should deny certificates of public convenience and necessity to motor truck lines competing directly with railways furnishing adequate service.

RAILWAYS SHOULD SUPPLY ALL FORMS OF TRANSPORTATION

Labert St. Clair of the American Electric Railway Association spoke of the advantages of electric railways taking up any kind of transportation demanded by the public. He said that if the public wants to ride in buses or manufacturers wish to ship by motor truck, electric railways should beat the independent operators to the job of supplying this service.

Electric railways must recognize the fact of motor truck freight haulage, and they cannot avoid it, said W. H. Collins of the Fonda, Johnstown & Gloversville Railway. He told of methods used on his lines to attract business, such as the adding of industrial sidings and giving the best possible service so as to deliver goods right at the door of the plant. This is proving of particular help in drawing business to the electric railway which would otherwise be handled by motor truck companies.

Victor S. Curtis, the Connecticut Company, said that he considered it the duty of electric railway officials to try to get the various motor truck freight transportation companies regulated. He felt that they should obtain certificates of convenience and necessity, the same as the electric railways.

Comments on motor truck freight transportation were made by Mr. Morgan, who told of some things being done in the Middle West which have proved of advantage to electric railways. He said that the various railway companies should put their houses in order and move freight while others slept, instead of loading in the early morning hours and moving it during the day time. He said that railways in the Central West had found sidings of particular help. Celery from Kalamazoo is now shipped by electric railway to Detroit, a distance of 146 miles, during the night, arriving in the Detroit market early in the morning.

T. C. Cherry, president Auburn & Syracuse Electric Railroad, said that he considered that certificates of convenience and necessity should be required

for motor trucks. He made a motion that this subject be referred to the legislative committee of the association.

METHODS OF CHARTING STATISTICS OF OPERATION

A. L. Hodges, assistant secretary and assistant treasurer Brooklyn City Railroad, presented a paper on the value of daily operating statistics and how they are obtained. An abstract of this paper will appear in a future issue.

In discussing this paper, Mr. Morgan explained some of the high points of the various charts exhibited and emphasized the value of getting information to the management quickly if it is to be of value in remedying conditions.

J. A. Queeney, Philadelphia Rapid Transit Company, said that he had adopted the same general system of plotting operating statistics as explained by Mr. Hodges, and found these of great assistance in showing what each car is earning and the various costs that result. The layover time has been reduced considerably in Philadelphia as a result of such a study.

In Terre Haute one department kept conditions charted and these are of great value, according to E. M. Walker, president Schenectady Railway.

H. W. Blake, editor *ELECTRIC RAILWAY JOURNAL*, referred to the charts as a fine example of the science of transportation engineering. He said that power station operation charts had been used for a long while but that the application of charts to transportation should be of great service in solving their particular problems. They are even more important to the transportation department than to the power department, because its gross expenses were greater. Study of these records shows where the service is most needed and where it is more profitable.

How the auditor can assist the manager was told in a paper by E. H. Reed, who spoke again during the afternoon session. The usual monthly balance sheet should be perfectly clear. It is now perhaps as concise and satisfactory as could be desired, but all those who are entitled to know the facts contained therein may not grasp the full import of a financial statement in the accepted form. The accounts should be stated in enough detail and clearness of expression to be easily ready by those most interested in the company's financial affairs.

A balance sheet which gives comparison of figures of the current month with that of the previous month, and also with that of the same month in the previous year gives the management a broader view of the financial affairs of the company, which could not be obtained in any other manner.

ANTIQUATED TAXATION SYSTEM

The faults of our present system of taxation were emphasized by the Hon. George H. Moses, United States Senator from New Hampshire, who was the speaker at the informal dinner, at which

Mr. Morgan acted as toastmaster. Taxation is based on an antiquated model, according to Senator Moses, developed to meet a wartime emergency. It is unjust and inquisitorial and leads to extravagant appropriation of the public's money. The six states of Illinois, Massachusetts, Pennsylvania, New York, Michigan and Ohio pay 62 per cent of all Federal taxes, the state of New York alone paying 26 per cent. This money is used largely to pay the salaries of an army of Federal office holders who interfere in the life of every citizen. Things which in the past were left to the individual to do are now turned over to some governmental employee. In short, there is altogether too much government, in the opinion of Senator Moses.

The so-called dollar-for-dollar system of appropriations he also condemned. Several illustrations to show how heavily this bears upon a few states were given. A system of taxation which would make every citizen a taxpayer should be developed. A sales tax would be the best method of attaining this object, in the opinion of Senator Moses, although he favors the plan proposed by Secretary Mellon.

Prevention of Automobile Accidents*

By J. J. SHARKEY

Claim Agent New York State Railways, Rochester

HOW can transportation companies prevent the volume of accidents which are increasing all the time because of the addition of two or three hundred thousand automobiles in this state every year? The proposed annual licensing law which the Legislature in this state has been asked to enact this year will be, at best, only a minor success. Automobile accidents in Massachusetts, which has had such a law in force for some time, are as numerous as in states that have no such laws. New York City, which has annual licensing, shows about as many accidents, proportionately, as does the rest of the state where no such law applies. Practically all the public utilities in this state and country that are engaged in street car transportation have been asleep at the switch, or, at least, have not acted for their best interests and the public welfare when they have not agitated universal compulsory liability automobile insurance.

According to insurance companies' figures, 50 per cent of all automobile owners have no liability insurance. Seventy-five per cent is the generally accepted number of automobiles that carry no liability insurance. In Rochester, one-third of all the litigation before the City Court, more than 1,000 cases annually, are automobile liability suits. Because the trolley company is an insurance carrier, and the majority

*Abstract of a paper presented at the Midwinter Meeting of the New York Electric Railway Association, New York, Jan. 24, 1924.

of automobile drivers have no liability insurance, the injured party knows full well that it is useless to sue the latter. But in cases of small damage, if he can, even in a remote way involve the street car in the accident, he is quite likely to get his damage costs.

If a compulsory liability automobile insurance law could be brought about, it would be only just. We ought to have an intelligent, practical working committee whose constant effort should be to obtain compulsory automobile liability

insurance, so that the various trolley car companies operating in this state would not be the easy marks they now are. This committee ought to be a standing committee, well versed in legislative matters. At present a number of insurance companies are afraid of a compulsory automobile liability insurance law for two reasons, because it would make them pay claims that are now largely paid by the trolley companies, and because the state might write automobile liability insurance.

district, and should parallel some of his best rail lines with a de luxe type of bus service at a double rate of fare, what would happen? It is a fairly safe prediction that a large part of his traffic would be immediately transferred to the better bus service, and he would at the same time accomplish three things.

He would incline his patrons to admit that under changing conditions he should receive more money for a satisfactory transportation service. He would create a disposition to accept a graded rate of fare. He would immediately relieve the congestion which handicaps the operation of all rail systems at the peak-load periods of the day.

As to the type of bus most suitable to the requirements of railways, it is an open question to which as yet very little serious attention has been given.

As to the manner of utilizing the bus there is even more doubt. Positively expressed opinions as to where the bus begins and ends in fulfilling the requirements of street railways are to be accepted with extreme caution.

OPPORTUNITY TO DEVELOP MOTOR FREIGHT SERVICE

With the railway company operating motor buses, it would be warranted in doing other things which would tend to expand its business. Conspicuous among these opportunities is freight transportation. There is an urgent need at the moment for the so-called store-door delivery. The steam railroads have repeatedly expressed themselves as standing in readiness to co-operate with any reliable organizations that will execute the freight transfer desired. What would be more logical than an operation of this kind by the railway company? This addition to their present operation naturally suggests the combined use of rail and motor vehicle facilities, and obviously, freight haulage and transfer of other types could be readily be accomplished. These might embrace parcel post, express transfer service, and possibly the conveyance of package merchandise in containers from city centers to outlying distributing districts.

Presumably these departures from current practices may have little appeal to the older men in the business, particularly those who have devoted a lifetime to creating the existing street railway system. There may be others also who will cast them aside as impracticable. But we might quote from Herbert Spencer, "There is a principle which is a bar against all information, which is proof against all argument and which cannot fail to keep a man in everlasting ignorance. This principle is contempt prior to examination."

The railway business of the future will be in the hands of the most alert and aggressive executives that can be picked for the purpose. They will not be too firmly rooted to fixed opinions, but will maintain mobility of viewpoint, together with ability to utilize the experience of others.

The Motor Bus—Keynote of Expansion for Street Railways*

BY WILLIAM P. KENNEDY

President Kennedy Engineering Corporation, New York

TO GAIN a true picture of where the street railway business stands with reference to its past and future in the field of public transportation, let us resort to a psychological device used by our college professors. This is a graphic picture in the form of a fluctuating curve showing the progress in the accomplishment of our purposes.

At the beginning of any new undertaking, when we are full of enthusiasm and driving force, our rate of progress is rapid and the curve in the picture goes up steeply. Shortly afterwards when our initial energies become somewhat dampened, the curve of our performance shows some fluctuation, but we continue to progress upward until we reach what is called a flat. In other words, at this point the number of obstacles which hinder our progress has stalled us. Our enthusiasm is gone and we can make no forward movement above this flat until some newly-discovered factor creates renewed energy. Then we go ahead until the next flat is reached.

CURVE OF RAILWAY PROGRESS TAKES AN UPWARD TREND

From this it will be seen that a curve showing vertically the amount of our accomplishment, and horizontally the time spent in attaining it, would be a curve rising sharply at the beginning, but afterwards rising more slowly with a succession of flat places where obstacles were encountered. The street railway industry, for some little time past, has been on one of these flats. Whether it would go upward or downward from that position has been very seriously in question. Fortunately, as has been made known to us through statistics recently collected and issued by the A.E.R.A., the curve has now taken an upward trend. With this encouragement the attitude of managements in the street railway business has been materially altered in favor of adopting new means for stimulating progress.

The purpose of this paper is to lay stress on the following facts: First, that we are still located in the static position represented by the flat in the curve mentioned; second, that the vital issues before the executives of the business are to discover new methods for business expansion; and third, that there is a large volume of new business available to these executives, in new forms of transportation service, if they are progressive and fearless enough to adopt plans somewhat novel, but nevertheless necessitated by changing conditions.

The motor bus appearing in the situation at this time should be seized upon by railway organizations as a means of release from confinement to the limits of rail operation. With the use of the motor bus as the first step in undertaking transportation of a flexible character, they can progress later into a variety of other forms of transportation, which are logically open to them.

It is necessary to dissolve the fixed belief that the public is not willing to pay higher prices for better forms of service. The whole history of our progress in this country proves the contrary. When fast freight was first introduced it was immediately seized upon and liberally supported. When express company service came into being it was sustained. Various forms of Pullman, high-speed, de luxe equipment are patronized to such an extent that the demand seems always greater than the supply.

If, therefore, the public is always willing to pay an increased price for better service, this would warrant railways doing many things which at first sight might appear radical but would be fundamentally sound. If the railway executive changed his present attitude of barring motor buses from all forms of competitive service, regulating them to the outskirts and ragged edges of his system, where he tries to justify their use by admitting that they may prove serviceable as feeders, but incidentally handicapping them with the poorest revenue possibilities in his

*Abstract of a paper presented at the Midwinter Meeting of the New York Electric Railway Association, New York, Jan. 24, 1924.

One-Man, Two-Man Cars and Train Operation*

BY D. L. FENNELL

Superintendent of Transportation
Kansas City Railways

WITHIN the past two or three years many companies have come to the conclusion that many economies of the Birney car can be obtained with double-truck cars. This has led to the adoption of one-man double-truck cars, one-man, two-man double-truck cars, and train operation. Some street railways have so remodeled their equipment that they are now operating exclusively with one-man double-truck cars. There are times when, due to heavy traffic demands, it is thought necessary to have conductors on the cars. With a one-man, two-man car it is easy to add this man temporarily and drop back to one-man operation as soon as the heavy traffic is over.

As a matter of economy, several of the big companies have for years been running during the peak hours two-car trains composed of a motor car and a standard trailer. Such operation is not only more economical but more efficient than the operation of two single units.

Motor car and trailer trains do not make for flexible operation. By using all motored units with train control the handling of the rush-hour cars on and off the line is much simplified.

The Kansas City Railways has developed a car for use as a one-man, two-man car and for train operation. This car, which was described in *ELECTRIC RAILWAY JOURNAL*, March 10, 1923, and Dec. 8, 1923, is being operated during the off-peak hours with one man. During the rush hours two cars are coupled together as a train. The second car is handled by one man stationed on the front end and the leading car has a crew of two men. The all-day operator of this car becomes motor-man and a conductor is placed at the rear. After the rush hour train operation is discontinued and the second car after being cut loose is sent to the carhouse with the two conductors.

This method of operation is in successful use on one of the most heavily traveled lines in the city, without adverse comment or criticism from the public. By the use of the one-man car in non-rush hours and the three-men train during the rush hour a 50 per cent increase in seats is given in the off-peak hours, and 20 per cent more seats during the rush hours. This has been accomplished with a 20.7 per cent decrease in platform cost, although a 5-cent an hour bonus or premium is paid for one-man operation. Man-hours are decreased 23.7 per cent and 16 per cent fewer men are required to operate the schedule.

In making the change from two-man to one-man operation on double-truck cars it has not been necessary to in-

crease to any extent the time per trip. The use of trains during the rush hour does much to decrease congestion in the business district and makes for speedier operation, in that there is only one movement over an intersection. In addition, the time lost by cars being blocked or held back by autos is reduced 50 per cent.

While trains are not yet operating with two men during the rush hour, I see no reason why this cannot be done. One objection to one-man operation in the rush hour is that passengers must board and leave at the front end. This can be overcome, as in Kansas City, by placing a valve on the outside of the car so that the street collector can, by inserting a key, open the rear doors of the car to load passengers at front and rear simultaneously.

ONE-MAN OPERATION BEING INCREASED

The Kansas City Railways has been gradually increasing one-man operation, so that now 24.6 per cent of the car-hours operated are run in this manner. I am personally an advocate of one-man operation during the entire eighteen or twenty-four hours of the day, even on double-truck cars, as a much larger saving can be secured. For example, by operating all cars with one man straight through the rush period it is possible to secure a 44 per cent decrease in platform cost, even though an additional 5 cents an hour is paid. If no increase in service is necessary during the off-peak hours, a 50 per cent decrease can be obtained in the number of men required to operate the schedule.

All cars for one-man operation should be equipped with double doors at the front end, making it possible for passengers to alight while others are boarding. This not only decreases the stopping time but makes a favorable impression on car riders.

Some mistakes have been made in the past in the use of both the Birney type car and the one-man double-truck car, in that instead of dividing the savings with their patrons by an increase in service, particularly in the off-peak period, there has been some disposition on the part of some managements to maintain the same headway formerly in effect with the two-man cars. This has, I believe, been the cause of the criticism on the part of the public, and much of the agitation against one-man cars would have been averted had the service furnished been made more attractive through increased cars and seats.

Indiana Utility Men Meet

EXTENDED use of the one-man electric car in heavy traffic streets, using the heavier cars for elevated, subway and suburban service, was

prophesied by Robert M. Feustel, president Indiana Service Corporation, Fort Wayne, in an address before the annual meeting of the Indiana Public Utility Association, held at Purdue University on Jan. 15 and 16. Buses will be used more extensively, he said, to investigate the probable amount of traffic for proposed new lines. Due to the low return on investment he believes that municipal ownership is desirable and inevitable.

Electrolysis problems were discussed by Prof. D. D. Ewing of Purdue University, and preventive measures were explained. A number of other topics of interest to utility men were discussed.

Paris Tramway Convention in June

THE date has been set for the convention to be held this year in Paris by the International Tramway Association. It is to be from June 16 to June 24.

A.E.S.C. Special Trackwork Committee

THE third meeting of the sectional committee on specifications for special trackwork materials and design of 7-in. plain girder rails of the American Engineering Standards Committee was held at New York on Jan. 17. It was stated that the report of the sub-committee on scope had been submitted to and approved unanimously by the track committee of the American Railway Engineering Association. There was general discussion concerning the advisability of attempting to include specifications to cover rerolled rails and rails and materials for mine and industrial tracks. The difficulties in the way of standardizing specifications for such materials were emphasized.

Dr. P. G. Agnew, secretary of the A. E. S. C., explained what action had been taken toward securing co-operation with the American Institute of Mining Engineers and American Mining Congress, and what results had been accomplished.

It was decided to omit the tensile test for both grades of gray iron castings. Since suggested specifications call for a very high grade of malleable iron, the sub-committee was requested to formulate a supplementary specification under which parts of trackwork not requiring such high grade may be manufactured. Several proposed rail sections had been considered and it was decided to prepare drawings for 7-in. plain girder rails to weigh 83, 93 and 101 lb. per yard, respectively.

It was decided to hold the next meeting at A.E.R.A. headquarters, New York, on Thursday, Feb. 28, 1924. Those present were V. Angerer, chairman; C. A. Alden, R. C. Cram, E. B. Entwisle, G. L. Fowler, Hess (representing C. D. Young), E. F. Kenney, E. M. T. Ryder, E. P. Roundey, E. C. Schmidt, J. B. Strong, G. C. Hecker, and H. H. George.

*Abstract of paper presented before the Mid-West Electric Railway Association, Springfield, Mo., Jan. 17, 1924.

Handling Freight on Electric Railways*

By W. A. CLOUGH

Railway Engineer General Electric Company

AS A rule, the interurban road laid out twenty years ago was after passenger business primarily, and freight was given very little consideration. Consequently the franchises and physical layout were apt to be unfavorable to the handling of freight. Now, the passenger business has in many cases decreased to a point where these same roads are looking hopefully to their freight business to pay expenses, but in many cases the awkwardness in physical layout and the consequent uneconomical handling allow the motor truck to compete for certain classes of this business.

The outlook is not at all hopeless. To begin with, we have to accept the fact that automotive transportation is here to stay and will continue to take certain classes of both passenger and freight business. There is and will continue to be unfair competition to meet; legislative regulation must be secured and enforced, and, what to my mind is more important, a strong campaign must be waged along lines of educating the public as to the true cost of operating their private cars and trucks.

While just at present the best service is apt to get the largest proportion of the business, in the long run the most economic operation, coupled with adequate service, is bound to win.

In many instances the passenger traffic has been made profitable, and roads slipping into financial quicksands have been put on solid footing by the introduction of sane economies, such as light-weight equipment and one-man operation, coupled with attractive service. To a lesser degree these same roads have benefited by the same sane economies in the handling of freight. It is more sensible to handle 10,000 lb. of net freight in a car that weighs 30,000 lb. and operated by one man rather than in a car that weighs 70,000 lb. and is operated by two men.

DEVELOPING FREIGHT BUSINESS

From an analysis of the governing conditions it would seem that roads doing a package freight business should develop it along the lines of small units in multiple; that roads doing a general freight business in l.c.l. lots should develop this with heavier motor cars and trail box cars, and the road having a large proportion of carload movement should develop such business with locomotive-hauled trains.

In some places freight service is profitably augmented by pick-up and delivery service by truck, for which the customer pays an extra charge. Where regular customers are served, or where there is regular traffic between businesses in different cities, the use of

large and uniform sealed containers should be encouraged, both to prevent loss and damage and also to speed up handling. In the larger terminals freight handling equipment should be developed to replace the use of stevedores.

As a fundamental necessity in the study of freight problems, the true cost of handling freight must be known. The freight revenue is usually segregated, but frequently no attempt is made to apportion cost of operation fairly between freight and passenger business. The customary practice is to prorate costs on a car-mile basis, but obviously ton-miles is a fairer basis. Yet this again is inaccurate because speed and frequency have a bearing on maintenance.

As an illustration of the divergence of results in determining costs, I have secured costs on two or three different classes of freight, and the costs have been allocated on approximately the same basis.

FREIGHT COSTS COMPARED

On a large interurban system, operating a high-grade passenger service, a package freight service and a carload freight business, the cost for the merchandise freight, including taxes, depreciation on way, equipment, power facilities and the apportionment of general expenses on a car-mile basis, is 74 cents per car-mile or 7.5 cents per ton-mile of net freight. The same road operating carload freight with electric locomotives in carload lots does it for a cost of 20 cents per car-mile or 1.7 cents per ton-mile of net freight.

On another road whose freight business is a smaller proportion to the total business and confined entirely to merchandise freight the cost per car-mile is 46 cents. On still another large interurban system the cost of l.c.l. and carload freight is about 41 cents on a car-mile basis, but varies between 1.17 cents per ton-mile of net freight for carload movements and 5.15 cents per ton-mile of net freight for l.c.l. movements.

ALLOCATION OF EXPENSES

In ELECTRIC RAILWAY JOURNAL of Sept. 9, 1922, R. S. Drews of the Indiana Service Corporation presented a table showing the net earnings over the period of November, using two different methods of allocation of expense and revenue. By one method, the conclusion is that the net earnings are 5.2 cents per car-mile and by the other method the figures show that there is a deficit of 1.05 cents per car-mile. This table gives an idea of how important it is to make a proper allocation of expense and earnings to determine whether freight business is profitable or not.

Frequently the electric line is an

ideal feeder for steam lines. Working agreements for interchange with steam roads and joint tariffs should be diligently sought. Handling costs of different classes of freight should be analyzed and the most profitable class developed. Care should be exercised to develop facilities along with increased business.

And most important of all, there must be an endless search after ways and means to permit one man to handle more tonnage, to permit one locomotive or car to move more tons one mile, and to offer better and more convenient service and facilities to those whose business you wish to secure.

Fuel Economy Discussed

THREE sessions on fuel economy were held by the Engineers' Club, of Philadelphia, Jan. 15, at which prominent engineers and industrial leaders presented papers. President Robert H. Fernald of the Engineers' Club presided.

Transportation was the topic at the morning session. Papers were presented by Prof. E. C. Schmidt, G. M. Basford, W. G. Bessler, R. M. Smith and J. Keller. The papers dealt with the use of fuel by the railroads and the possibilities of securing greater economy by using improved locomotives and better equipment for pumping stations and power stations. Mr. Basford stated that under present conditions a comparison of the best steam and electric locomotive practice would give an equality in cost at the drawbar. But maintenance conditions, operating conditions and road operations for steam equipment were very bad, as the average steam locomotive worked less than six hours per day and its operating conditions had been fixed by transportation requirements and historical developments. On the other hand electrical systems were installed and operated in the light of the best modern science and new and very efficient operating conditions. The possibilities of using Diesel drive, the still locomotive and other agencies were discussed, but the opinion predominated that the steam locomotive would be the chief agency for transportation.

In the afternoon Morris L. Cooke discussed the Giant Power Survey of Pennsylvania. He outlined its objectives as: (1) Building of large steam stations not less than 600,000 hp.; (2) locating these stations at or near the mines; (3) putting all energy generated into a 220,000-volt statewide transmission system; (4) the practice of by-product recovery in power production; (5) integration of power systems to secure maximum advantages from interconnection; (6) providing abundant power to small users, particularly the farmers; (7) railroad electrification after a national transportation policy had been determined. Some of these objectives are somewhat ideal and how far to go in bringing them about will be determined by the survey.

*Abstract of paper presented before the Mid-West Electric Railway Association, Springfield, Mo., Jan. 17, 1924.

Mid-West Association in Lively Meeting

Freight Traffic, Bus Operation, Shop Practice and Kansas City One-Man, Two-Man Car and Three-Man Train Operation Are Discussed

ONE hundred and fifteen strong, the members of the Mid-West Electric Railway Association assembled at Springfield, Mo., on Jan. 17 for their third quarterly meeting. Under the able leadership of President D. L. Fennell, superintendent of transportation Kansas City Railways, the association held a profitable business session.

The entertainment program arranged by A. E. Reynolds, vice-president and general manager of the local property, comprised a series of novel features which began with the presentation by the Mayor of a huge key to the city, and included a luncheon served in the turbine room of the Springfield Traction Company's new power house.

W. A. Clough, railway engineer General Electric Company, read a paper on the subject of electric railway freight traffic, which is abstracted in this issue. In the discussion, C. W. Ford, general superintendent Kansas City, Clay County & St. Joseph Railway, stated that 85 per cent of the freight handled by that road is l.c.l., carried in 60-ft. motor cars and special trail cars designed to take the track curves on the property. This practice, he said, is followed because clearances are not quite sufficient to accommodate the standard box car. Under these conditions hauling costs are 40 to 41 cents per car-mile.

An interesting development of terminal switching business by the Kansas City Railways was described briefly by F. G. Buffe, general manager. The question of pick-up and delivery business was brought up by Mr. Ford. He said that the charge of 7 cents per ton made by trucks for handling freight from railway terminals made it possible for trucks handling materials in intercity hauls and rendering a pick-up and delivery service actively to compete with rail lines for certain classes of business. The handling of l.c.l. livestock was reported to be an attractive business by O. S. Lamb, superintendent Kansas City, Kaw Valley & Western Railway.

W. S. Tuley, secretary and treasurer Kansas City, Clay County & St. Joseph Railway, sounded a warning in connection with interline freight agreements under the jurisdiction of the Interstate Commerce Commission, by calling attention to a possible interpretation of the recapture clause contained in section 15A, Art. 422 of the transportation act, which would affect passenger earnings.

BUS OPERATION

A paper on bus operation was read by F. S. Welty, assistant general manager Omaha & Council Bluffs Street Railway. He said that bus operation is a live subject at this time and is of interest to all engaged in the busi-

ness of public transportation. It is now the generally accepted opinion that the bus is a valuable agency of transportation if used in the proper field, that of auxiliary or feeder service to existing transportation systems and service to territory not already provided with adequate rail transportation.

Rail transportation, said Mr. Welty, is cheapest and best where the density of traffic demands short headways, and the gas bus is cheapest for long headways, with the trolley bus intermediate between the two.

In thirty-two states public utility commissions have some sort of jurisdiction over the motor bus and in twenty they are empowered by law to issue certificates of convenience and necessity.

As to the feeling that prevails to some extent that bus operation is more economical than electric car operation, Mr. Welty cited figures collected by the committee on bus operation of the American Electric Railway Association, showing for twelve companies average operating costs of 24.6 cents per bus-mile, compared with an average for ten companies of 25.7 cents per car-mile for safety cars. The corresponding costs per seat-mile are 0.98 cent for the bus and 0.61 cent for the street car, or 60 per cent greater for the bus. Speaking of the gasoline tax, he mentioned that thirty-six states have a gasoline tax. In England the tax on gasoline has been abolished and a tax on licenses substituted. The tax on a bus seating twenty-six to thirty-two passengers is \$350 in London and \$290 elsewhere in England. Approximately \$48,000,000 is raised through this method, he stated, but this amount is only one-fifth the annual road maintenance cost.

THE RELATION OF BUS OPERATORS TO ELECTRIC RAILWAY ASSOCIATIONS

The subject of taxes and operating costs for buses was discussed briefly by M. J. Oswald of the St. Louis Car Company and B. Hilburn, general manager Tulsa Street Railway. F. G. Buffe raised the question of the proper policy for railway associations regarding the bus. That buses are here to stay and that sooner or later many railway companies will use them was considered a well-founded conclusion. Their possible field of usefulness in city transportation, however, was held to be limited to purely an auxiliary de luxe service, for which the public is willing to pay a higher price. Mr. Buffe maintained that the introduction of buses for city feeder or crosstown service would in many cases be followed by a public demand for continuous bus transportation to the business districts. Because of the fact that admission of independent bus companies to electric railway associations would in many cases admit bus operators who were

actively competing with existing rail lines, he advocated opposition to such action by the railway associations.

A resolution subsequently was adopted on the subject of bus membership, to the effect that it is the sense of the association that the admission to membership of bus-operating companies in this or any other strictly electric railway association is a recognition of the necessity of duplication of transportation facilities and competition with the street railways, and as such is contrary to the best interests of the industry.

In the afternoon session, John S. Dean, Westinghouse Electric & Manufacturing Company, read a paper on shop practice and the maintenance of railway motors. The paper was illustrated by lantern slides and was discussed informally during its presentation. An abstract will appear later.

"One-man, two-man cars and train operation" was the subject of a paper read by D. L. Fennell, president of the association. This paper is also abstracted elsewhere in this issue. The use of remote exits on one-man cars was brought up in the discussion by J. L. Adams, superintendent of transportation Denver Tramway. Although this practice is followed by some properties with apparent success, it was felt that interchange at the front end under the direct supervision of the operator was the safer practice.

On account of the Midyear Meeting of the American Electric Railway Association at St. Louis on March 4 it was decided to postpone the annual meeting of the Mid-West Association to some time in June, the location being left open.

The final event of the meeting was a dinner. Addresses were given by several prominent men of Missouri, including Judge John S. Farrington and E. E. McJempsey. L. W. Baldwin, president Missouri Pacific Railroad, and a large group of other officials of the road were present as guests. Mr. Baldwin, in his talk to the association, said that the future of the transportation business, both steam and electric, depended on the fullest appreciation of the importance of selling the public a service which they want to buy.

Proposed Standards for Wrench Head Bolts and Nuts

THE first tentative report on standard dimensions for square and hexagon wrench head bolts and nuts has just been completed by a sub-committee on wrench heads, bolts and nuts of the sectional committee working under direction of the American Engineering Standards Committee. The material included consists of seven tables, supplemented by text and charts, to show various dimensions for width across flats of all types. The report is now available in pamphlet form for general distribution. Copies may be had by applying to the assistant secretary of the American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York, N. Y.

American Association News

Tentative Program for Midyear Meeting

TRAFFIC problems and the improved financial condition of the industry will be the leading topics at the Midyear Meeting of the American Electric Railway Association to be held on March 4 at the Hotel Chase, St. Louis, according to the tentative program announced by Secretary J. W. Welsh.

President Budd will be toastmaster at the dinner, which will begin at 7:30 p.m. The speeches will include an address of welcome by the Governor of Missouri, Hon. A. M. Hyde, and addresses by Hon. Eliot Wadsworth, Assistant Secretary of the Treasury, and Judge B. F. Brough, Mayor of Toledo.

The program of the technical sessions follows:

The topic of the morning session, "Traffic Problems in Cities," will be opened with an address on this subject by Harland Bartholomew, city plan engineer of St. Louis. This will be followed by a discussion led by men who have studied the problem particularly in five of the large cities of the United States.

At the afternoon session the improved financial condition of the electric railways will be discussed in three addresses.

Following the afternoon session a reception to members and guests will be held.

The program of the business sessions is given below:

MORNING SESSION

10 A.M. to 1 P.M.

ADDRESS OF WELCOME—Honorable Henry W. Kiel, Mayor of St. Louis, Mo.

ADDRESS—President Britton I. Budd.

"Traffic Problems in Cities."

ADDRESS—Harland Bartholomew, city plan engineer, St. Louis, Mo.

DISCUSSION

New York City—Dr. J. A. Harriss, Special Deputy Policy Commissioner, New York, N. Y.

Cleveland—J. J. Stanley, president Cleveland Railway, Cleveland, Ohio.

Chicago—R. E. Kelker, Jr., Kelker, De Leuw & Company, Chicago, Ill.

Boston—Henry I. Harriman, chairman Metropolitan Planning Commission of Boston, Mass.

Los Angeles—G. B. Anderson, manager of Transportation Los Angeles Railway, Los Angeles, Cal.

AFTERNOON SESSION

2:30 P.M. to 5:30 P.M.

"The Improved Financial Condition of Electric Railways."

ADDRESS—J. K. Newman of Newman-Saunders & Company, New York, N. Y.

ADDRESS—H. E. Riggs, professor of civil engineering, University of Michigan, Ann Arbor, Mich.

ADDRESS—B. C. Cobb, Hodenpyl, Hardy & Company, Inc., New York, N. Y.

New Publicity Material

THE advertising section of the American Electric Railway Association has prepared a series of twelve attractive poster advertisements, each

under the caption "Who Uses the Electric Car Lines?" Each advertisement depicts in a black and white sketch a different class of street car patron. The association has arranged to furnish cuts or mats for use in daily newspapers.

Power Generation and Conversion

A MEETING of the committee on power generation and conversion was held at New York, Jan. 18, with the following in attendance: L. D. Bale, chairman; C. E. Bennett, H. W. Coddington, H. E. Davis, H. A. Kidder, F. W. Peters and V. H. Mueller, representing G. W. Saathoff. G. C. Hecker of the association staff and C. L. Riley, representing the American Society of Heating and Ventilating Engineers, also were present.

Sub-committees selected to handle the several assignments were appointed as follows:

Subject No. 1: R. L. Weber, chairman; C. E. Bennett, W. E. Bryan, H. A. Kidder, N. R. Love and L. J. Turley. It was felt that the committee should limit its activities to the preparation of a method of recording interruption to service, confined to the plants themselves. This would include not only trouble originating within the plant, but would list also troubles elsewhere on the system that when reflected to the plants would cause interruption to service.

Subject No. 2: T. H. Schoepf, chairman; H. W. Coddington, F. C. Harker, G. H. Kelsey, F. W. Peters, A. E. Stierly. It is desired that this committee define the various types of partial automatic and full automatic substations, together with a general analysis of the various service applications. The numerous types of d.c. feeder control system as utilized in various automatic substations are to receive consideration. The application and relative benefits derived from the shunt converter compared with the compound wound converter are to be included. Due to the importance of applications of remote and supervisory control systems it is deemed advisable to cover this subject not only from the standpoint of the control and supervision of the automatic substation but to include applications as applied to power production plants, transmission lines and distribution systems.

Subject No. 3: F. W. Peters, chairman; C. E. Bennett, W. E. Bryan, H. E. Davis, F. C. Harker, H. R. Love and L. J. Turley. It was thought desirable to seek the services of men to work with this committee who were primarily interested in and intimately acquainted with the subject of ventilation. Accordingly, a request was made for co-operation with the Ameri-

can Society of Heating and Ventilating Engineers, the committee of the A.E.R.E.A. to be responsible for the report.

The committee is to suggest such methods of ventilation as affect the automatic substation, with reference to design of buildings, equipment or both, to bring about desired conditions in the various types of services. These suggestions should cover both natural and mechanical means of ventilation. The necessity on some systems of limiting noises arising from equipment operation will involve consideration of noise-proof substation buildings, particularly for use in residence districts.

Subject No. 4: G. W. Saathoff, chairman; H. W. Coddington and H. A. Kidder. The work of this committee involves the review of existing standards.

Engineering Manual

A MEETING of the committee on Engineering Manual of the Engineering Association was held at New York, Jan. 15. Those present were: R. C. Cram, chairman; C. R. Harte, Daniel Durie and G. C. Hecker.

A complete review was made of the entire Engineering Manual, which had been set up in revised form for republication. All of the revisions approved by the committee on standards and the 1923 convention have been incorporated in the Manual sections, and a number of the drawings have been revised so as to eliminate large folded-in pages. Some additional drawings will have to be made in order to eliminate folded pages completely. It is anticipated that by the time these have been received the Manual will be ready for the printer. The committee believes it will be ready for distribution to the membership about April 15.

Coffin Prize

A MEETING of the Charles A. Coffin Prize Committee was held in New York on Jan. 11 with Britton I. Budd, J. N. Shannahan, James H. McGraw, J. G. Barry, R. R. Trench and J. W. Welsh present. The form of the letter to be sent out this year inviting the companies to make presentations for the prize was approved. The proposal to publish the 1923 presentations in book form was considered and tentatively approved provided the Coffin Foundation would take care of the expense. Mr. Barry later advised the committee that the foundation would do this.

The plan of publishing the book will probably be to edit the matter submitted by all companies into eight chapters, one on each of the subjects outlined by the committee in its instructions last year, rather than to publish the reports as such in the book. If the book is printed it will probably be distributed by the association or the foundation to various companies and others who may be interested in receiving it.

Maintenance of Equipment

Home-Made Bearing Press Prevents Loose Babbitt

ARMATURE bearings are pressed into their housings in the shops of the Connecticut Company, New Haven, Conn., by means of a shop-made press. A 12-in. brake cylinder is mounted on one of the upright posts in the shop at a convenient location and the stroke of the cylinder piston is regulated by means of a straight air brake valve.



Pressing an Armature Bearing Into Its Housing in the Shops of the Connecticut Company

A gage is mounted on the post immediately above the brake valve, so that the pressure can be watched by the operator as the bearing is pressed into the housing. A maximum of 65 lb. is allowed, and this is not exceeded as experience has shown that heavier pressures squeeze the bearings out of shape to such an extent that binding occurs and hot bearings result.

Before this press was devised bearings were pounded into position by using wood blocks and mallets. Bearings were frequently distorted and the babbitt was sometimes loosened by this operation. With the use of the bearing press there are no sudden jars to loosen the babbitt,

and there is no guessing of the amount of pressure which is being applied, as this is shown by the gage.

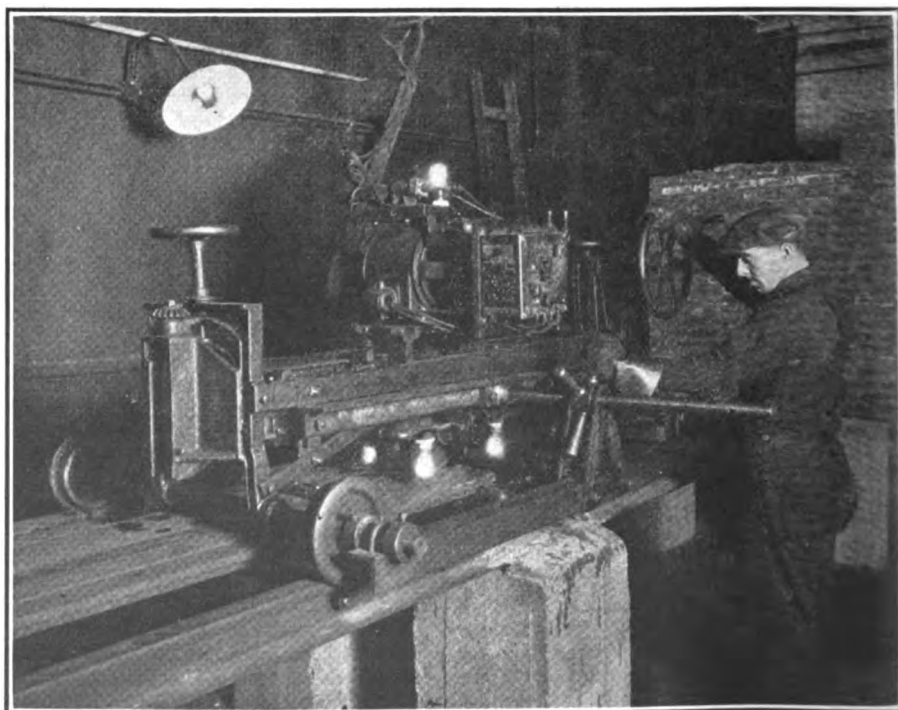
Maintaining Conduit Conductor Rails

THE maintaining of conductor rails by electric railways using the underground conduit system is quite as difficult a proposition as that of maintaining the overhead structure and trolley wire on other roads. As the conductor rails are inclosed in the conduits underneath the street, it is necessary to remove them in order to carry out satisfactory repairs. The rails wear at the ends and breaks occur at these points. Also, sections become burnt, due to improper contact bearing with the shoe or on account of the occurrence of short circuits. In order to make repairs to the conductor rails in an efficient manner, the New York & Harlem Railroad, New York, N. Y., has installed some special equipment in its Ninety-sixth Street shop.

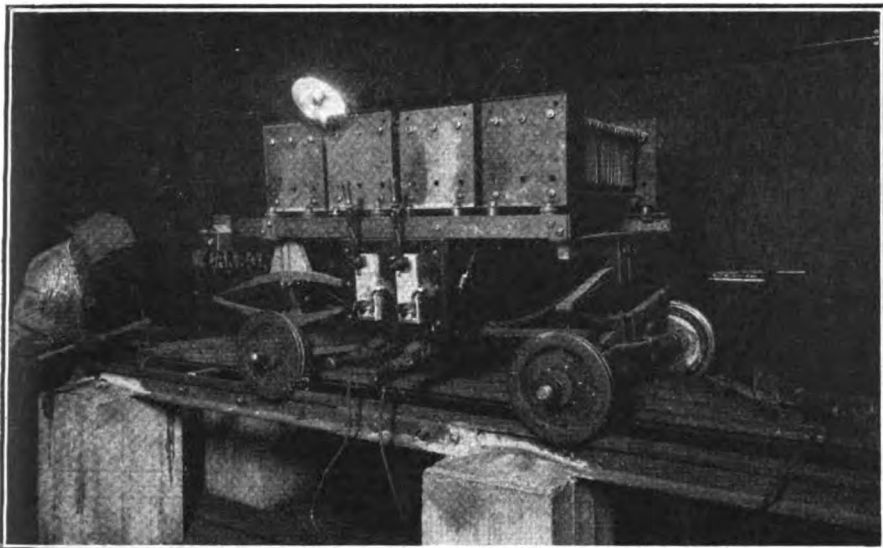
Most of the maintenance repair work consists of building up worn or burned portions of the rails by electric welding, and afterward grinding

these smooth. In order to bring the welding and grinding equipment to a convenient height for efficient work, an elevated track has been constructed. The rails are raised about 3 ft. above the floor level and are supported on concrete piers. The welding equipment and grinder have been mounted on wheels so as to operate over these elevated rails. The conductor rails on which work is to be done are clamped firmly between the two operating rails, with supporting cross-members at each pier. The standard length of these conductor rails is 30 ft. Additional space is left at either end so that the welding and grinding equipment can be moved out entirely free of the ends of the conductor rails.

Accompanying illustrations show the welding and grinding equipment in operation. The welding equipment consists of four frames of resistance mounted upon a framework, with control switches and fuses mounted on the side of the carriage, and two car circuit breakers mounted at the end. Two receptacles are provided for plugging in the two leads necessary to connect to the electric circuit for welding. The carriage is con-



Grinding the Built-Up Portions to Give a Smooth Surface



Building Up Worn Ends of Conductor Rails by Arc Welding

structed with two Ford axles having small wheels suitable for track operation mounted on them. The flanges of the wheels are placed on the outside of the rails in order to give additional clearance between the rails, so that six lengths of the conductor rail can be worked on at one time. The ground connection of the welder consists of a large bar of iron of sufficient length to span six conductor rails. It has a handle on top. One end is taken up with a receptacle in which the lead from the welding equipment can be plugged. With this arrangement the welding equipment can be rolled back and forth so as to be in close proximity to the place of welding. One man can then control the equipment and perform the welding operation.

The grinder used consists of standard Atlas equipment with special mounting to suit the conditions. The carriage has the wheels mounted

with the flanges on the outside, the same as with the welding equipment. Controls for moving the grinding wheel forward and backward and also across the rails are arranged at the side of the carriage, so that the operator stands on the floor and controls all movements of the grinder. Through the use of this equipment rails are being reclaimed at a cost of less than one-fifth of what would be necessary to purchase new ones.

Handling Construction Sand

ALL sand used by the Market Street Railway in San Francisco in concrete, filling, etc., is obtained from an inexhaustible supply that is constantly being shifted in from the Pacific Ocean by the wind. A portable electric elevator of special construction, working from a spur track that parallels the sand

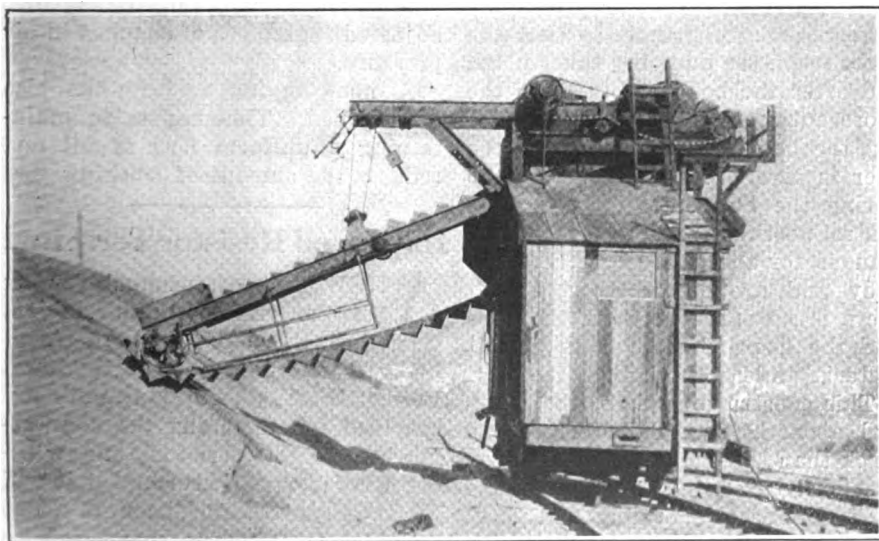
dunes, loads the sand into cars, which are run onto a second spur paralleling the first track. A 20-yd. car can be loaded in this manner in ten minutes, only one man being required to operate the elevator.

Some Precautions Needed for Good Spray Painting

BY DENNIS O'BRIEN,
Foreman Painter Brooklyn-Manhattan
Transit Corporation

WITH the increased use of paint-spraying equipment several troubles have been emphasized that are sometimes attributed to the paint gun or air brush, while in reality their cause lies somewhere else. These include pitting, sags and runs in the paint after it is applied, and excessive vapor fumes that arise during the painting operation. An analysis of the causes for pitting shows that it comes from the condensation of water upon the paint, enamel or varnish film. Pitting of the surface is not only a blemish but it is a menace that will destroy the entire job by decreasing the life of the paint. Pit marks soon accumulate molecules of water, which become blisters when the paint or varnish is dry. A condensation of moisture upon the varnish or enamel film before this has hardened will produce blooming and result in pitting. It is thus apparent that moisture should be kept out of the paint during the spraying operation. Certain paint-spraying equipment includes a water separator, which is attached to the material tank. Where such a separator is not used as a part of the paint-spraying equipment particular precautions should be taken in the shop air supply to prevent water condensation in the air reservoirs or piping, which is used with an air compressor to supply the necessary pressure for the spraying operation.

The most fruitful cause for sags and runs is incompetence of the workmen or unfamiliarity with the proper use of the spraying equipment. If the painter operates too close to the surface being painted an overaccumulation of material will result and sags and runs will occur in these places. This occurs more frequently with a "fugitive" paint; that is, a paint which has insufficient binder, lack of volatile matter, or a drier of poor quality or insufficient in amount. During the period that the paint is drying it is constantly taking on oxygen and giving



Portable Electric Elevator Used for Filling Sand Car in San Francisco

up carbon dioxide. This action causes the paint to contract. If the paint is fugitive, runs and sags will appear due to the pigment deserting the vehicle.

In spraying varnish, an excessive amount of vapor or fumes has occurred in many cases, which takes place while the material is in the process of atomizing. Paint manufacturers have realized that the amount of vapor can be decreased considerably by the combinations used with their paint. Considerable time and expense have been given toward developing a varnish which will not give off an excessive amount of vapor. Apparently the most satisfactory result can be obtained with varnish by modifying the formula to adapt it for spraying. The volatile thinners incorporated in the varnish are needed, but the amount necessary may be cut down, or an "extender," which is not so active, may be used. Proper selection of gum for the manufacture of varnish is another important consideration. The resin gums used in varnish are of the soft or non-fossil type. Hard fossil gum will absorb a greater amount of the volatile matter than will the soft gum. By cutting down the percentage of volatile matter through the use of a neutral gum, which will absorb a large part of the volatile matter, the amount of vapor given off can be reduced considerably.

The oil in the varnish should not be overtreated with driers, as cracks and checks are sometimes caused by an oil medium which is not stable under the progressive influence of oxidation. The use of the air gun tends to impregnate the varnish with oxygen, and as the driers are oxidizing agents, the importance of proper selection of these will be readily appreciated. In addition to the disagreeable effects produced by excessive fumes, there is also an economic objection. The volatile matter leaving the paint gun carries a certain amount of varnish with it, which means a loss of material. Varnishes, as usually constituted, include but little lead drier, so that there is no danger of poisoning.

Some colors used in car painting give more difficulty from clouding than others. This is particularly true of the various yellows, which are now coming into more general use for painting electric cars. Painters find the operation of applying these colors either in japan or varnish with paint-spraying equip-

ment somewhat tedious, and as a result only the best mechanics can be trusted to apply these colors properly.

Proper air pressure is an important consideration, as the lower the air pressure the more even will be the flow of materials, so that a better leveling out is the result. The experience of the writer has shown that best results are obtained by setting the material gage at 20 lb.

and the air line gage at 30 lb. An allowance is also made of about 1 lb. of pressure on each gage for every foot of height above the floor. Thus, if when a car is to be sprayed it is placed on jacks bringing the point of spraying 10 ft. above the floor, the material gage should show 30 lb. and the air line gage 40 lb. As the height at which the operator works is decreased, the air pressure should be reduced accordingly.

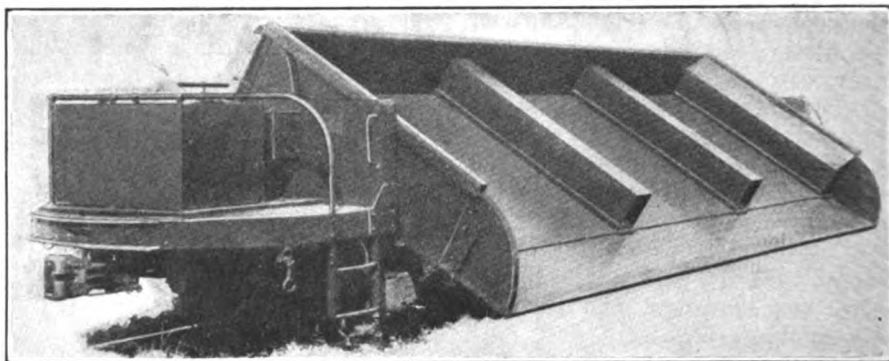
New Equipment Available

Dump Car with Door Chute

A NEW development in dump cars has just been added to the standard construction of cars made by the Differential Steel Car Company, Findlay, Ohio. The sides of the car are hinged at the bottom instead of the top, so that they form a chute when folding down. This extension places the material further from the track when dumped than with the

New Oil-Burning Torches

A LINE of pressure torches and Arivet forges has been placed on the market by the Johnston Manufacturing Company, Minneapolis, Minn. To overcome difficulties from variable air pressure in shops the burners are designed so that the vacuum by which the oil is drawn up varies directly as the air pressure. The relation between



The Sides of This Dump Car Form a Chute, Thus Placing Material Further from the Track

previous type of construction. The operation is controlled from the motorman's control handle so that the doors open, the dumping takes place, and after the body rights itself the doors automatically close. In righting the body the movement of the door is reversed so that it folds up during the horizontal travel to the central position. The doors are continuous for the entire length of the body and are so constructed that there is no space between the door and the floor of the car to permit material to leak through.

This construction places the material about 2 ft. further from the track than the standard construction previously used and is an advantage as it eliminates shoveling and plowing to move the material free of the track.

the air and oil supply is, therefore, automatically maintained as first adjusted regardless of changes in air pressure.

A non-clogging feature has also been added. This assists in maintaining a uniform flow of oil and reduces the amount of smoking.

Improved Resistor Terminal

A NEW type of terminal for its Vitrohm resistor units has just been brought out by the Ward-Leonard Electric Company, Mount Vernon, N. Y. Two brass nuts are provided for fastening the connecting lead to this terminal, and without other means of attachment it will act as a support for the unit. The terminal permits the connection to be locked firmly and then soldered.

The News of the Industry

Home Rule Hearing Set

Cities of New York Would Have Permissive Rights Over Utilities Under Proposed Legislation

The enabling act proposed by the home rule commission of New York confers in simple and concise language upon the various cities a reaffirmation of all powers now existing under the constitution or granted by special law or special statute and in addition gives to them the right to adopt such further measures or amendments to existing laws as may be necessary in relation to their property, affairs or government.

The act, in general, makes the legislative government of a city conform as nearly as may be to that of the state. The common council may pass measures, which may be approved or vetoed by the mayor; it may re-pass a vetoed measure over his objections by a two-thirds vote, and a measure presented to the mayor and in his hands for thirty days without approval or disapproval arbitrarily becomes effective at the expiration of such time. Local laws must all be drawn in the same general form, may embrace but one subject and certified copies thereof must be filed with the Secretary of State at Albany.

Subdivision 2 of Sec. 11 of the enabling act, however, seems to afford assurance against a city plunging haphazard into a program of municipal ownership and operation of public utilities beyond the authority now vested in them by their charters and by special or general laws, as the phrase "not inconsistent with the constitution and laws of the State" can mean only that the city in order to start any such undertaking must proceed as a private corporation in relation to consents, authorization of capital outlay, rates, fares, and charges and the many other details essential to be complied with by a public service corporation before commencing to function.

It would appear that the matter of the extent of this power in relation to ownership and operation of public utilities will no doubt ultimately be a question for the courts to decide. Certain it is, however, that where a city, under the provisions of its charter or by any general or special law, now has such right, it may continue so to do, but in any event before engaging in any such activity in competition with an existing public utility, or otherwise, it must obtain a certificate of necessity from the Public Service Commission.

A public hearing on the proposed act is to be held at Albany on Jan. 30.

Subject to such amendment as intelligent discussion may suggest, it will be redrafted and presented to the Legislature for approval.

Transit Commission Appointed

The appointment of a Transit Commission in Philadelphia, Pa., was authorized in a resolution presented by Charles B. Hall and adopted at a recent meeting of the City Council.

The commission will be composed of Mayor Kendrick, City Solicitor Gaffney, Charles B. Hall and Council committee on transportation and public utilities. In addition there will be a representative from the Chamber of Commerce, the Manufacturers' Club, the Operative Builders' Association, the United Business Men's Association, the Real Estate Board and the Builders' Exchange.

The commission, it is expected, will have broad powers in relation to city transit matters and problems concerning the building, financing and operation of high-speed transit lines.

New York Central Loses Buffalo Electrification Case

The city of Buffalo was the victor in the first round of the battle being waged between the municipality and the New York Central Railroad in an attempt to have the railway comply with the provisions of the ordinance adopted by the city some years ago requiring the roads entering the city to electrify their lines within the city. Judge Harry L. Taylor in Supreme Court dismissed the complaint of the New York Central in the action which it started against the city to prevent the municipal authorities from enforcing the electrification ordinance. The New York Central will take the case to the United States Supreme Court. The railroads entering Buffalo were required by the ordinance to file electrification plans by Jan. 1, 1922.

I.C.C. Will Hear Electric Railways on March 19

Consideration of the questions involved in the determination of the electric railways which come within the purview of the interstate commerce act will be taken up at a hearing at the Interstate Commerce Commission in Washington on March 19. The hearing was scheduled for Jan. 23. The postponement was made necessary by the far-reaching character of the commission's opinion in the matter of the valuation of the Washington Railway & Electric Company, referred to in the ELECTRIC RAILWAY JOURNAL previously.

Dynamiters Convicted

Four Former Buffalo Employees Found Guilty of Conspiracy in Connection with Interurban Disaster

Four former platform employees of the International Railway, Buffalo, and members of the Amalgamated Association, have been found guilty before Judge Morris in United States District Court of conspiracy to violate the Sherman anti-trust law in obstructing interstate commerce in connection with the dynamiting of the Buffalo-Niagara Falls high-speed line of the International at Ellwood Station during the early days of the 1922 strike.

The men are Francis Reilley and Healey Breeze, Buffalo; William H. Smith and William L. Vandell, Lockport. Sentence will be imposed on Jan. 28. Under the law, the maximum penalty is one year in jail and a fine of \$5,000 or both. Counsel for the Amalgamated Association will appeal the verdict to the United States Circuit Court of Appeals.

Trial of the second group of the eighteen men under indictment in connection with the alleged dynamiting conspiracy will be moved by William J. Donovan before Judge John R. Hazel on Feb. 4. Among the next prisoners to go on trial will be State Senator Robert C. Lacey, John M. Parker, president of the Buffalo local of the Amalgamated; Clarence F. Conroy, business agent of the Amalgamated, and Vincent Tuero, financial secretary of the union.

The trial opened on Jan. 15 and the verdict was reported early in the evening of Jan. 21. None of the defendants took the witness stand and only three witnesses were called by the defense. Mr. Donovan, who conducted the prosecution, was called as a witness by the defense. He was asked to produce certain statements said to have been made by Vandell and Smith before the Federal Grand Jury. He was sustained by the court in his refusal to produce these statements, but added:

"I will testify to this—that Smith told me they got the dynamite to blow up the tracks."

Guy B. Moore, district attorney of Erie County, said he will present the evidence in the alleged dynamiting conspiracy to the County Grand Jury in an effort to seek indictments charging first degree assault with intent to kill and transportation of dynamite without a permit. Conviction on these charges carries a penalty of ten years.

One of the star witnesses for the government was Alvin Heineman, a roadhouse keeper, who confessed on the stand that he took part in the theft of

dynamite from the magazine of a Lockport hardware store.

Witnesses during the first two days of the trial were passengers on the train that was dynamited. They testified to threats made by alleged strikers at the time they boarded the cars in Buffalo. The motorman of a Buffalo-bound train on the International who rendered first aid at the time of the accident testified that he found a bur-lap bag containing fifty-five sticks of dynamite wired to the Buffalo-bound tracks.

Virgil P. Jackson, a former International employee, and one of the fourteen men still to be tried, was taken into custody by Federal Secret Service operatives just as the trial of the first four defendants was nearing a close. He had escaped capture for several months. He was committed to jail under orders of the federal prosecutor.

Look and See Public Utilities at Work

"The Open Window" is the name of the new bulletin of public utility information which will be issued from time to time by the Oregon Public Utility Information Bureau. The first pamphlet gives some interesting information on public utility courses which are being conducted in various colleges and schools, and the financial needs of electric railways throughout the country, and tells just what the yearly payroll is for the seven leading utilities included in the Oregon Public Utility Information Bureau. The committee which makes up the bureau is composed of executives of the leading utilities of the state, companies that have \$125,000,000 invested in Oregon and that furnish service to 200,000 regular customers. W. P. Strandborg of the Portland Railway, Light & Power Company is director of the bureau, with office in the Electric Building, Portland.

New Companies Take Over Katy Line

The Oklahoma City-Ada-Atoka Railway has been authorized by the Oklahoma Corporation Commission to acquire from H. R. Hudson a line formerly belonging to the Missouri, Kansas & Texas Railway, extending from Shawnee, Okla., to Coalgate, approximately 77 miles, together with equipment and other property. Another order authorizes the Oklahoma City-Shawnee Interurban Railway to acquire from H. R. Hudson a line formerly belonging to the Missouri, Kansas & Texas, extending from Oklahoma City to Shawnee, approximately 39 miles. The orders are dated Jan. 7. No information is contained in the orders as to what persons constitute the companies named in the order. Recent newspaper accounts, however, state that these two sections of the old Katy line, which extends from Oklahoma City to Atoka, are to be operated by the companies

mentioned in the order, the section extending from Oklahoma City to Shawnee to be electrified and the section extending from Shawnee to Atoka to be operated as a steam railroad.

Electrification Under Way

Contracts Awarded for Material for Dallas-Denton Line—Completion Expected in Fall

Work has commenced on the electrification of the steam line of the Missouri-Kansas-Texas Railway from Dallas to Denton, Tex., a distance of 47 miles. It is under the direction of Richard Meriwether, vice-president and general manager of the Dallas (Tex.) Railway and vice-president of the Texas Construction Company, which has been organized to carry out the electrification project.

The Dallas-Denton line, when electrified and put in operation, will be a duplicate of the Dallas-Terrell line, which has been in operation one year on Jan. 13 of this year. Similar overhead construction will be employed, similar trolley poles and trolley wire used, and the automatic substations on the Dallas-Terrell line will be duplicated on the Dallas-Denton line.

Orders have been placed for most of the material to be used, and it is expected that this material will begin arriving in Dallas by April 1. In the meantime grading and other construction work will be carried forward. The overhead construction will be of the catenary type. Contracts for copper feed lines and copper trolley wire have been awarded to the Southwest General Electric Company.

There will be three automatic substations, each a duplicate of the stations built and in operation on the Dallas-Terrell line. One of these substations will be located near Farmer's Branch, about 13 miles out of Dallas. A second will be located just beyond Carrollton, about 24 miles out of Dallas, and the third will be located about 2 miles from Denton. Contracts for the equipment for the substations have been awarded to the General Electric Company.

Current for operation of the line will be supplied by the Texas Power & Light Company. That company now has several feed lines within 10 to 15 miles of the interurban line. A connecting transmission line will be built to deliver current to the interurban company's feed lines at 60,000 volts.

New tracks must be laid for connection of the tracks of the Dallas Railway in Dallas with the main line of the steam road near Hudnall, a station just outside the city limits near the Love Field Industrial District north of the city. This will require construction of about 1½ miles of trackage. Seventy-pound standard A.S.C.E. rail for this construction and for the extension in Denton from the point where the cars will leave the steam line to the interurban station uptown has been

ordered from the Bethlehem Steel Company.

Six passenger cars will be used, exact duplicates of the cars in service on the Dallas-Terrell line. They will be lightweight cars, built by the American Car Company. Each car will be 45 ft. in length over all and will seat fifty-four passengers. The cars are designed so they may be operated either by one man or two men. Motors and control will be supplied by the General Electric Company.

The Dallas-Denton Katy electrification project is being carried out by the Dallas Railway interests in fulfillment of commitments made at the time the present franchise was granted the railway interests in Dallas in 1917.

As stated previously, Mr. Meriwether will have active charge of all details of the electrification project. B. R. Brown is chief engineer and will have charge of engineering details of the electrification. B. F. Cook is electrical engineer and will have charge of the installation of the three substations and other electrical installation on the line.

Receiver Talks Direct to Riding Public

Something unusual has again been done by the New York & Queens County Railway, Long Island City. General Lincoln C. Andrews, the receiver, has reported direct to the riding public in a statement issued on Jan. 18 in which he summarized the accomplishments of the management during the year with the defunct railway. Just a year ago from the date of the statement the New York & Queens County Railway went into receivership by order of Supreme Court Justice James C. Van Sicken.

It was a very serious question at first, General Andrews explains, whether the road would be able to function more than a few weeks without the continued financial assistance which had for years been given by the Interborough Rapid Transit Company. Carmile earnings were and still are the lowest of any company in the entire city of New York. The receiver started in the dead of winter, when receipts are lowest and expenses highest, because of fighting snow storms and heating cars. However, the new management saw enough opportunities for improving the operations of the company to justify the determination to make the road go, and to go better for all concerned.

General Andrews says that the daily passengers are the best judges of what has been accomplished in that line, and although there is still much room for improvement, it seemed appropriate at the end of the first year to call attention to the more important changes that have been made. He then proceeds to tell about the new direct service installed, the bonus for employees, the twelve new one-man cars, the track rebuilt, the cars repainted and repaired, the decrease in accidents, etc.

Dr. Maltbie Retained by Chicago City Administration

A study of Chicago's transportation problem will be made by the city administration under direction of Dr. Milo Roy Maltbie, New York, who has been engaged temporarily at the rate of \$100 a day and personal expenses. Dr. Maltbie, it is expected, will complete the analysis of the many reports and valuations of the traction lines in Chicago within sixty days, and thus at an expenditure of only \$7,000 Corporation Counsel Busch hopes to effect a saving of \$100,000 to the city through elimination of duplication of effort. Moreover, Dr. Maltbie's findings are expected to give the Mayor the figure at which he should effect a settlement with existing surface and elevated lines. His report will also serve as a guide for the administration in fixing its subway construction policy. Headquarters have been established by Dr. Maltbie at the office of the Board of Supervising Engineers.

Wage Bonus Arranged for Men on Toledo Suburban Lines

New wage agreements involving a profit-sharing plan have been completed between representatives of the employees and the managements of the Maumee Valley Railway and the Northwestern Ohio Interurban Railway at Toledo.

The Northwestern Ohio men in passenger service will receive an increase of 5 cents an hour and men in freight service an advance of 7 cents an hour. A minimum ten-hour day is provided. The new agreement dates back to Jan. 1, 1924.

If the passenger revenues increase 10 per cent during the first six months of this year as compared with the first six months of last year the men will receive an additional raise of 2 cents an hour.

The new scale on the Maumee Valley lines is 53 cents an hour for the first three months' service and 55 cents an hour thereafter. There is a provision in this contract whereby the men receive an additional $2\frac{1}{2}$ cents an hour on each \$1,000 increase a month in the gross earnings of the company above \$11,000 a month. This plan was in effect in December and the men received 60 cents an hour by the bonus arrangement.

This company is operating its new equipment on the one-man plan with helper.

Rules Are Adopted to Govern Buffalo Co-operative Wage Fund

Regulations governing the Co-operative Wage Fund of the International Railway, Buffalo, have been adopted by the Co-operative Council. The fund will be administered under the direction of the council by a board of trustees consisting of four members, the president, vice-president, secretary and treasurer

of the co-operative association. The wage increase granted to employees on Jan. 1, 1924, has been turned into the fund by 99 per cent of the company's employees and the trustees are authorized to use this fund to purchase securities of the International Railway.

The trustees will issue to members of the fund, non-transferable participation certificates in amount equal to the wages deposited in the fund by the individual members.

Girard Passes Ordinance—Service Continuance Up to Niles

The Girard City Council recently granted the West End Traction Company, a subsidiary of the Pennsylvania-Ohio Electric Company, a new franchise calling for increased fares between Girard and Youngstown. This action follows close upon the decision of the Warren City Council in authorizing increased rates.

The new franchise which expires in January, 1948, provides for a cash fare of 15 cents between the two cities, with the privilege of purchasing ten tickets for \$1. Between the northerly limits of Girard and Stop 7 the cash fare will be 10 cents, or six tickets for 50 cents. There is no provision in the ordinance for service between Girard and Niles. The ordinance as proposed stood for a straight 10-cent fare in the city and the company agreed to the ticket concession and also to a concession providing for six "owl" cars between 11 p.m. and 5.30 a.m. to take care of the men going to and from their work.

A settlement on the continuation of electric railway service in Trumbull County, between the easterly limits of Girard and Warren, is up to Niles and a final decision is awaited. The controversy between Niles and the West End company started over the Robbins Avenue paving work.

News Notes

Public Trustees Reappointed.—Governor Cox of Massachusetts has reappointed Arthur G. Wadleigh, Frederick J. Crowley, Earle P. Charlton, Isaac Sprague and George M. Bryne as public trustees of the Eastern Massachusetts Street Railway.

Will Reduce Pay.—The Selma Electric Railway, Selma, Ala., has notified its employees that their salaries will be reduced on Feb. 1. This is a last resort to keep the cars running. It is said that the Selma railway has been operating at a loss for the past three years.

Property for Depot Acquired.—The last property needed to complete the site of the new depot of the Louisville & Interurban Railway, Louisville, Ky., was recently acquired. No definite information has been given as to when the construction of the new interurban

depot will be started. Some of the buildings at the far end of the block have already been wrecked, to make room for the depot, and others are to be wrecked shortly, as most of the tenants have vacated.

School for Supervisors Started.—A semi-annual school for supervisors has been started by the Los Angeles Railway, Los Angeles, Cal. The course consists of five lectures on various features of electric railway service given by department heads. The subjects announced are "discipline and deportment," "rules and their interpretation," "forms of transportation," "emergency action in handling accidents," "legal highlights of accidents," "schedules," "maintenance of regular service," "mechanical and electrical equipment." For the last meeting arrangements were made for demonstrations at the shops, conducted by the engineering department.

Tie-Up Delays Commuters.—Power was off the electrified lines of the entire Pennsylvania system from Manhattan Transfer to Long Island City on Jan. 21 from 5.15 until 6.48 p.m. As a result not a train moved during that time. The shutdown of train service was caused by an accident to the rotaries in the substation supplying this section of the line.

Wages Advanced.—The Commission Council of Monroe, La., has increased the pay of operators of the Monroe Street Railway, owned by the municipality, to a schedule amounting to 45 cents an hour. Increase in pay was granted according to a statement issued by the Commission Council because of the faithfulness of employees during the preceding year, and because the earnings of the company have increased and are continuing to increase.

Wage Demands Made.—During his appeal before a special Council committee for better operating conditions for the cars of the Georgia Railway & Power Company, H. M. Atkinson, chairman of the board of directors of the company, stated that the employees had already demanded a 25 per cent increase in pay. He said that at the expiration of the 1923 labor contract the men had presented their demands, which had been submitted to arbitration. He said that the company told the men that not even the merits of the increase could be considered until the railway end of the business was placed on a paying basis.

New Subway Proposed.—Legislation is proposed in the Massachusetts House of Representatives for a new subway in Boston to run under the aristocratic Commonwealth Avenue and under the Public Garden and Boston Common, to connect at Park Street with the present subway system. The novel feature is the provision for automobile parking spaces on both sides of the new subway, to relieve congestion on the surface. Warren E. Locke is the sponsor for this proposition.

Financial and Corporate

New Chicago Company

Chicago Rapid Transit Company Is the Successor Under Reorganization to the Elevated Railways There

Following the recent sale of the common stock of the Chicago Elevated Railways pledged as collateral to secure a note issue, the plan to reorganize the properties proceeded without further interruption. In accordance with the plan the Northwestern Elevated Railroad, the South Side Elevated Railroad and the Metropolitan West Side Elevated Railway have been consolidated as the Chicago Rapid Transit Company with the approval of the Illinois Commerce Commission. Another step to be taken will be the sale of the Oak Park Elevated Railroad by Samuel Insull as receiver to the Chicago Rapid Transit Company. This move only awaits the formal approval of the court. The sum of \$7,700,000 is the reported price to be paid for this property.

The officers of the Chicago Rapid Transit Company are: Samuel Insull, chairman of the board of directors; Britton I. Budd, president; R. Floyd Clinch and E. C. Noe, vice-presidents; B. J. Fallon, vice-president and general manager; W. V. Griffin, secretary-treasurer; E. A. Brion, comptroller, and T. B. MacRae, auditor. These men all held offices with the separate companies corresponding with those to which they have been elected with the successor organization, except that Mr. Fallon, who was general manager, has in addition been made a vice-president.

The sale of the properties has been referred to previously in the *ELECTRIC RAILWAY JOURNAL* and mention has been made before, also very briefly, of the financial set-up of the successor company. Under the reorganization the capitalization will be scaled down \$34,700,000, from about \$121,895,000 to \$87,196,500. This has been accomplished by wiping out the preferred and the common shares of the Chicago Elevated Railways, which were pledged to secure the notes.

The capitalization of the new company will be:

CAPITALIZATION OF SUCCESSOR TO CHICAGO ELEVATED RAILWAYS	
First lien and refunding mortgage gold bonds, Series A, 6 per cent (due July 1, 1953).....	\$1,600,000
Adjustment debenture bonds (due July 1, 1963)	18,563,000
Common stock (par \$100)	20,329,500
Underlying securities, which remain undisturbed	46,704,000
Total capitalization	\$87,196,500

In consideration for the surrender and cancellation of the stocks and indebtedness of the three subsidiary companies it was proposed to deliver to the reorganization committee \$1,400,000 of

first lien and refunding mortgage bonds, \$16,380,000 of adjustment debentures and \$10,150,000 of common stock. In consideration for the surrender and cancellation of certain indebtedness it was proposed to deliver to the holders of claims of indebtedness \$200,000 of first lien and refunding mortgage bonds, \$2,183,000 of adjustment debentures and \$10,179,500 of common stock.

The holders of certificates of deposit representing the secured gold notes as extended to July 1, 1919, were to be entitled to receive for each \$1,000 of notes \$100 of first lien and refunding mortgage gold bonds, \$1,170 of adjustment debentures and \$350 of trust certificates for common stock. Holders of similar certificates of deposit representing the secured gold notes due July 1, 1916, but not extended were to be entitled to receive for each \$1,000 of notes, \$100 of first lien and refunding mortgage gold bonds and \$1,170 of adjustment debentures. The holders of the Chicago Elevated Railways ten-year 6 per cent debentures were to be entitled to receive for each \$100 of debentures \$70 in trust certificates for common stock of the consolidated corporation.

Purchase Offer Renewed at Boston

There will be a renewal this year of the proposition for the Boston Elevated Railway to take over a part of the property of the Eastern Massachusetts Street Railway in Chelsea and Revere, so as to extend the 10-cent fare to Revere Beach.

Representatives of the cities of Revere, Chelsea and Malden have conferred with Mayor Curley of Boston about the subject and the Mayor has ordered the Boston Transit Commission to investigate the merits of it and the finances involved. If the Boston Elevated acquired a line to Revere the 10-cent fare would automatically follow, as it is a charter provision for the Elevated to charge only a single fare in any one direction.

This proposition has been up for many years, at times before the Massachusetts Legislature, and at other times before special commissions and before conferences between the Boston Elevated Railway and the Eastern Massachusetts Street Railway officials.

Inability to agree upon the price that the Elevated should pay the Eastern Massachusetts for the section that would have to be taken is one reason why so little progress has been made in the past. There is a marked difference of opinion, also, regarding what part of the Eastern Massachusetts should be annexed to the Elevated, since there is more than one route from Boston into Revere.

Receivers to Be Discharged

Court Indicates that Formal Order Will Be Entered for Restoring Pittsburgh Railways to Owners

Formal order will be entered very shortly lifting the receivership of the Pittsburgh Railways. This was indicated in a statement made public by Judge Thomson of the United States District Court, on Jan. 24, in discussing the petition requesting such action. The opinion of the court reviews at length the situation affecting the company since the appointment of receivers in 1918. The court says that to deny the petition for the lifting of the receivership would probably result in the abrogation of existing contracts and also result in the parties concerned resorting to their respective rights and remedies under the law. Creditors have been patient, and have greatly aided the receivers in preserving the property from disintegration. The court's concern is that the property shall continue to be operated as a whole in the future.

In its decision thus to preserve the system in its entirety the court follows the advice of the special master in his conclusion that it is in the interest of the petitioner as well as the public that the receivership should be terminated as soon as possible so that the proposed reorganization may be permitted to proceed without delay.

The terms of the proposed reorganization have been reviewed previously in the *ELECTRIC RAILWAY JOURNAL* at considerable length. One of the most important provisions is the arrangement made for rehabilitating the property. The Philadelphia Company owns nearly all of the stock of the Pittsburgh Railways and many of its bonds and notes as well as obligations of the underlying companies and much of their stock. That company and the Pittsburgh Railways have entered into an agreement with the Union Trust Company, Pittsburgh, whereby the proceeds of two loans amounting to \$5,000,000 will be available in the reorganization, \$3,000,000 for the purchase of new cars and \$2,000,000 for the erection of car-houses and the carrying out of other improvements. So far as the general creditors of the Pittsburgh Railways are concerned they have agreed to the extent of nearly 97 per cent in amount to defer payment of their claims over a period of from one to ten years after a discharge of the receivers.

The court says that perhaps there is no system of railroad transportation in the country that is more involved and complicated than the Pittsburgh system. It is made up of more than 200 incorporated companies brought together through lease, agreements and stock ownership. In reviewing the recent earnings of the company the court says that the report of the special master for the year 1922 shows that there is a net income of \$329,329 from all sources in the hands of the receivers after the payment of all operating expenses, taxes, etc. This the

court indicates as a propitious sign for the future.

The court refers to the exception taken by Receiver Fagan to some of the findings of the special master and says that while it is not entirely satisfied that the facts warrant all the optimistic views of the petitioners and their counsel, the court itself has been governed by the fact that the plan seems to meet with the approval of the great majority of those most vitally interested, and appears to be for the best interest of all concerned.

Are Income Taxes an Operating Expense Under Service-at-Cost?

Commissioner Paul H. Maloney of the Department of Public Utilities at New Orleans and the officials of the Public Service, Inc., are in disagreement over a ruling made by City Attorney Kittredge as to what constitutes "operating expense." The officials of the Public Service, Inc., hold that money paid out by the public utility for income taxes is an operating expense.

With this view of the matter the City Attorney coincides. Commissioner Maloney, however, thinks differently. He holds that if this be true, it will seriously affect the rate base upon which the corporation is permitted, under its agreement with the city, to figure its income and would hence necessitate additional earnings of the company before the railway, power and gas rates could be reduced.

Commissioner Maloney admits that the earnings of the company this year did not permit the corporation to make its permitted rate of 7.5 per cent, but speaking for the future he said it would be establishing a precedent that he doesn't approve to allow the tax item in operating expenses.

Successor to San Francisco-Oakland Organized

Permanent organization of the board of directors and election of officers of the Key System Transit Company, which has acquired all of the property of the San Francisco-Oakland Terminal Railways, Oakland, Cal., was effected on Jan. 10.

C. O. G. Miller was elected president. W. R. Alberger was elected vice-president and general manager. W. W. Garthwaite was elected vice-president.

An executive committee, consisting of John S. Drum, P. E. Bowles, W. W. Garthwaite, Warren Olney and W. I. Brobeck, was elected, of which John S. Drum was appointed chairman and Mr. Bowles vice-chairman.

The directors elected are: W. W. Garthwaite, John S. Drum, H. C. Capwell, Warren Olney, J. F. Carlston, A. Crawford Greene, W. I. Brobeck, J. K. Moffitt, C. O. G. Miller, Robert G. Hooker, P. E. Bowles, Samuel Knight, Miles Standish, B. H. Dibblee and W. R. Alberger.

Hartford & Springfield Property Discontinues Certain Lines

The Hartford & Springfield Street Railway discontinued service Jan. 24 on the stretch between the Massachusetts State line and Windsor Locks, Conn., installing in its place a bus service. For some weeks the company has run a Fageol thirty-passenger bus as auxiliary service. Additional buses are being procured. Buses run from Court Square, Springfield, to Windsor Locks. Until further notice, however, one round trip will be made on the electric road between Windsor Locks and the State line in the early morning, making connections for Windsor and Hartford, but the fare is increased from three tokens for 15 cents to three tokens for 25 cents.

The stretch of road on which service has been discontinued consists of two sections under different ownership. The section from the State line to Kent's Corner in Suffield is owned by the New York, New Haven & Hartford Railroad and was for some time operated by the Springfield Street Railway under a lease and recently has been operated by the Hartford & Springfield. The section from Kent's Corner to Windsor Locks is owned by the Hartford & Springfield. No announcement has been made respecting disposition of properties that may be no longer needed by the company.

\$120,000 Loss in Louisville After Expenses, Including Dividends

Complete figures for 1923 operations of the Louisville Railway are not yet available, but the approximate figures indicate that the necessary expenditures for operation, taxes, fixed charges and dividend payments, as set out and provided in the ordinance under which the company is operating, are approximately \$120,000 more than were the earnings of the company from all sources.

The barometer fund stood at \$350,000 on Jan. 1, 1923, and at approximately \$230,000 on Dec. 31, 1923. There had been credited to the fund all earnings of the company and deducted from the fund all legitimate expense of operation, the net result being a decrease of \$120,000 in the barometer fund.

During the early part of 1923 programs for economies were incomplete, and it was known that they could not be completed until later in the year. It was, therefore, expected that the withdrawals from the barometer fund would be larger than normal. This is borne out by the fact that for the month of December a net increase in the barometer fund is indicated and a very considerable improvement is anticipated as soon as the powerhouse consolidation now under way is effected. This consolidation will put all power-generating facilities at the High Street plant.

President Barnes of the company has felt called upon to try to correct the impression which prevails locally that the ordinance under which the Louisville Railway is at present operating guarantees on the part of the city the fixed charges and dividends of the railway company.

This is not the case. He says the company can meet these obligations only if the earnings are sufficient to do so. No fare increase is possible during the years 1924 and 1925, and after that the fare cannot under the ordinance be increased beyond 7 cents straight, no matter how large the expansion may be to the company in the items of operating expenses, taxes and fixed charges.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares*	Jan. 1924 6.91	Dec. 1923 6.89	Jan. 1923 6.94	May 1921 7.24	May 1923 6.88
Street Railway Materials*	Dec. 1923 156	Nov. 1923 158	Dec. 1922 174	Sept. 1920 247	Sept. 1921 156
Street Railway Wages*	Jan. 1924 219	Dec. 1923 218	Jan. 1923 207	Sept. 1920 232	Apr. 1923 207
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Dec. 31 1923 4.45	Nov. 30 1923 4.37	Dec. 31 1922 6.75	July 31 1920 11.12	Feb. 28 1922 4.14
U.S. Bank Clearings Outside N. Y. City (Billions)	Dec. 1923 15.90	Nov. 1923 15.30	Dec. 1922 14.94	Mar. 1920 18.54	Feb. 1922 10.65
Business Failures Number	Dec. 1923 1,862	Nov. 1923 1,644	Dec. 1922 1,862	Jan. 1922 2,722	Sept. 1923 1,280
Liabilities (millions)	Dec. 1923 80.37	Nov. 1923 67.54	Dec. 1922 47.81	Jan. 1920 105.7	Sept. 1923 27.50

Conspectus of Indexes for January, 1924 Compiled for Publication in this Paper by Albert S. Richey Electric Railway Engineer Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	Jan. 1924 217.9	Dec. 1923 217.3	Jan. 1923 191.7	June 1920 273.8	Mar. 1922 162.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Dec. 1923 151	Nov. 1923 152	Dec. 1922 156	May 1920 247	Jan. 1922 138
Bradstreet's Wholesale Commodities 1913 = 9.21	Jan. 1 1924 13.27	Dec. 1 1923 13.44	Jan. 1 1923 13.70	Feb. 1 1920 20.57	June 1 1921 10.62
Dun's—Wholesale Commodities 1913 = 120.9	Jan. 1 1924 189.9	Dec. 1 1923 190.9	Jan. 1 1923 185.6	May 1 1920 263.3	July 1 1921 150.8
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Dec. 1923 150	Nov. 1923 151	Dec. 1922 147	June 1920 218	Mar. 1922 139
Nat. Ind. Conf. Bd. Cost of Living 1914 = 100	Dec. 1923 165.0	Nov. 1923 165.3	Dec. 1922 158.9	July 1920 204.5	Aug. 1922 154.5

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of

materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motor-men and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Talk of Merger of New York and Chicago Bus Lines

John A. Ritchie and John Hertz, representing the Chicago Motor Coach Company, conferred on Jan. 15 with General O'Ryan and Commissioner Harkness of the New York Transit Commission about the possible acquisition by them of the Fifth Avenue Coach Company. They stated that negotiations were under way but would not be consummated by them unless their plans met with the approval of the Transit Commission. They stated that, aside from any question of the legal powers of the commission in the premises, they would not care to enter the New York bus field unless such a course were agreeable to the commission.

If, on the contrary, that course did not meet with the approval of the commission they would immediately drop all negotiations. The matter was gone over at length and at the end of the conference the commissioners informed Messrs. Ritchie and Hertz that the matter would be taken under consideration by the commission and that a definite reply would be made shortly, when the deliberations were completed.

The Fifth Avenue Coach Company has been controlled by the New York Transportation Company, but with some 46 per cent of the stock in the hands of the Fifth Avenue Bus Company, organized subsequent to the collapse of the Interborough Consolidated. The company is supposedly controlled by Interborough Rapid Transit interests.

Service Suspended in Amarillo

The city of Amarillo, Tex., has again discontinued operation of the car lines of that city, having found such operation prohibitive on account of its cost. George S. Seideman, Houston, Tex., started a bus service to meet the transportation demands of the city, but this service was found unprofitable and has also been discontinued. The city now is without transportation facilities. The city officials are looking about and hope soon to announce completion of details by which the city will be given an adequate transportation system.

The Amarillo Traction Company suspended operation in 1920. Since that date and up to July of last year the city operated the railway under lease from the owners because the owners, unable to pay operating costs, proposed junking the line. When the contract expired in July of last year the city manager was instructed by the City Commission to notify the owners of the property that the city would not care to renew its lease or to undertake to operate the property longer. However, when the commission's decision became known a committee of business men got the city's approval of a plan for operation of cars for another sixty days by the city. A little while later the city resumed operation of the line, charging a fare of 5 cents instead of 10 cents, with the result that business picked up and it appeared that the

property could be made to pay operating expenses. The plan failed, however, and the city has again discontinued the operation of the line.

Street Tax Is a First Lien

The United States Circuit Court of Appeals has reversed the decision of Judge Robert E. Lewis while he was sitting in the District Court at Denver. Judge Lewis ruled that a franchise tax was an ordinary debt. The ruling was made in the case of the Denver Tramway. In 1906 that company agreed to pay a street tax of \$5,000 monthly and this it did up to the time of the 1920 strike. The company later went into the hands of a receiver. It then argued that money due for the tax—agreed to as owed—was, like the rest of its debts, to be paid in routine. The city disagreed and the case went before Judge Lewis in the Federal District Court. He decided in favor of the company. The amount due is \$205,000.

Three Ohio Roads Seek Permission to Abandon Service

The Cleveland, Alliance & Mahoning Valley Railway, Ravenna, Ohio; the Cleveland & Chagrin Falls Railway, Cleveland, and the Cleveland & Eastern Traction Company, Cleveland, all have applications pending before the Public Utilities Commission of Ohio for permission to abandon operation.

A hearing was held on Jan. 16 on the petition of the Cleveland, Alliance & Mahoning Valley Railway. That company operates from Alliance to Ravenna, with a branch from Ravenna to Warren. Fred S. Clingman, president, told the commission that the company is operating at a loss; that he is unable to pay taxes, and that banks will not loan him money. The road has been in receiver's hands since 1920. He said passenger receipts had fallen from \$186,000 in 1920 to \$143,000 in 1923. The company is in default of interest on its bonded debt of \$1,116,000. It operates 45 miles of line.

The Cleveland & Chagrin Falls Railway runs from Lynfield Wye in Shaker Heights near Cleveland to Chagrin Falls, a distance of 12 miles, and the Cleveland & Eastern Traction Company operates a main line from Lee and Mayfield Roads, Cleveland Heights, to Chardon, a distance of 25.5 miles, and a branch line from Warrendale Junction through Burton to Middlefield, a distance of 14.23 miles.

Successor to Orange County Traction Seeks Approval

No opposition developed at the hearing before the Public Service Commission at Albany on Jan. 16 on the matter of the reorganization of the Orange County Traction Company into the Newburgh City & Suburban Railway, Inc., to operate transit lines in Newburgh, N. Y., and immediate vicinity. It was stated in the evidence that the

new company proposes to take over all the franchises and property of the traction company, which except for one line has gone over to bus operation.

No Action on Abandonment.—The City Council of Toledo, Ohio, has taken no action yet on the abandonment of the Indiana line of the Community Traction Company, which has been before it for several weeks. This step was recommended by the commissioner nearly two years ago.

Terminal Line to Be Sold by Montreal Tramway.—The Montreal Tramways, Montreal, Que., has announced that it intends to apply to the Legislature at its next session for permission to sell that part of its system known as the Terminal Railway. Approval of the Montreal Tramways Commission to the sale will also have to be obtained. The right-of-way parallels the Canadian National lines through a large part of Montreal. Its purchase by that company will give the tramway a good amount of cash. The sale will be made to the Canadian National Railways, which requires the line to bring the right-of-way up to the standard width.

Increase of \$10,000,000 in Indebtedness Proposed.—At the annual meeting of the Philadelphia Rapid Transit Company on March 19 stockholders will vote on the question of increasing the indebtedness to \$25,000,000 from \$15,000,000. Among other business that will come before the meeting is a proposed renewal of the contract with Mitten Management, Inc.

Extension Granted for Transfer of Properties.—An extension of time has been granted by the California Railroad Commission until Feb. 1, 1925, to the Sacramento Northern Railroad, Sacramento Northern Railway and the Western Pacific Railroad in which to complete the transfer of properties from the former two corporations to the latter, and for the Western Pacific Railroad to purchase outstanding bonds of the Sacramento Northern Railroad and capital stock of the Sacramento Northern Railway. The Sacramento Northern Railroad operates 214 miles of electric line. It is at present a subsidiary of the steam railroad.

Authority Sought to Buy Eleven-Mile Road.—The Visalia Electric Railroad, Exeter, Cal., has applied to the Interstate Commerce Commission for authority to purchase from the Frank G. Drum interests 11.68 miles of the standard gage Chowchilla Railroad.

Conference on Abandonment.—Following the hearing held on Jan. 15 at Albany before Public Service Commissioner Parsons on the petition of the Kingston Consolidated Railroad for authority to increase its present fare to 10 cents cash and 8-cent ticket, there was a postponement until Feb. 5, during which time there will be a conference attended by railroad, city and other officials as to abandonment of that part of the road known as the Colonial Division. Abandonment was

suggested in lieu of any change in fare. Representatives of the civic association suggested a conference. Unless some agreement is reached at the coming conference, Commissioner Parsons will take the testimony at the next hearing and a determination of the matter will be made by the commission.

Petition for Sale Confirmation Approved.—The Board of Public Utility Commissioners of New Jersey has approved the petition of the Central Passenger Railway, Atlantic City, N. J., for confirmation of the sale of the Venice Park Railroad in 1912 and for the compromise of taxes for 1922 and 1923.

Default in Interest by Line in Connecticut.—The Groton & Stonington Street Railway, Groton, Conn., failed to pay the Jan. 1 interest on the 5 per cent first mortgage gold bonds due July 1, 1924. A committee has been formed in the interest of holders for protective action. The property on which the bonds are secured was formerly a part of the Shore Line Electric Railway, but it was sold to the Groton & Stonington Traction Company, organized specially to operate this part of the road. The Groton & Stonington Street Railway first 5s are outstanding to the amount of \$375,000.

May Sell Line for Scrap.—Bondholders of the Phoenixville, Valley Forge & Strafford Electric Railway, Phoenixville, Pa., have been informed a buyer for the road cannot be found, and that the creditors' committee had decided it was best for the bondholders to purchase it and sell it for scrap.

New Directors Elected.—Robert A. Taft and Samuel Assur, directors of the Cincinnati Street Railway, have been elected directors of the Cincinnati & Hamilton Traction Company, which property is under lease to the Ohio Traction Company, Cincinnati. They succeed J. W. Bullock and Edward Goepper, resigned.

Defaulted in Sinking Fund Payment.—The holders of the Mesaba Railway, Virginia, Minn., first mortgage 5 per cent twenty year gold bonds have been notified that the company on Jan. 1 defaulted in making the payment to the sinking fund provided for in the mortgage securing these bonds and that default in the payment of the interest installment due on March 1 is likely to occur. A committee for the holders of the bonds has been appointed under an agreement dated Jan. 14. This committee tells the holders that the bonds may be deposited on or before Feb. 15 with the depository.

Sale of Line for Scrap Approved.—The Missouri Public Service Commission on January 16 officially approved the junking of the St. Louis & Jennings Electric Railway, which ran from Jennings, Mo., to Robin and West Florissant Avenues, St. Louis, with a branch line on Helen Avenue. Wayne J. Stedlin, St. Louis real estate operator, who bought the line at auction more than a

year ago, has been authorized to sell the material in the line for scrap. Jitney competition proved the undoing of the road.

\$200,000 Increase in Bus Subsidiary Capital.—The Rochester Railways Coordinated Bus Lines, Inc., a subsidiary of the New York State Railways, operating trackless trolleys and bus lines in Rochester, N. Y., has filed notice with the Secretary of State at Albany of an increase in its capital stock from \$50,000, divided into 500 shares of \$100 par value, to \$250,000, divided into 2,500 shares of \$100 par value.

New Director Named.—Judge Charles H. Mayer was recently elected a director of the St. Joseph Railway, Light, Heat, & Power Company, St. Joseph, Mo. He replaces R. A. Brown.

Wants Line Discontinued.—The Huntington Traction Company, Huntington, L. I., has applied to the Public Service Commission for leave to abandon that part of its road between Huntington Station and Siding 7, alleging that it is operated at a loss and that it is no longer necessary for the public convenience. The petition says the highway from Huntington Station to Siding 7 is to be improved in the near future. If the company is permitted to remove its tracks the entire highway can be improved.

City Protests Valuation Items Totaling \$33,000,000.—Items amounting to more than \$33,000,000 should be stricken from the valuation figures of the International Railway, Buffalo, it was said by the city law department in the proceedings before the Public Service Commission in the rate investigation. The figures presented by the International, it was claimed by witnesses for the city, are "imaginary," based upon certain hypotheses that have no relation to actual experience. The figures which the city asks the commission to strike out of the company's valuation are: Promotion costs prior to construction, \$805,295; administration, legal and miscellaneous expenses, \$2,065,688; taxes during construction, \$515,000; interest during construction, \$151,000; loss of interest during early days of operation, \$5,179,266; brokerage and bond discount, \$7,631,556; going value, \$12,592,068.

Hudson River Tunnel Line Declares Another Dividend.—The Hudson & Manhattan Railroad, New York, has declared a semi-annual dividend of 2½ per cent on the preferred stock payable on Feb. 15 to holders of record of Feb. 1. An initial dividend of the same amount was paid on this issue six months ago. The directors also declared the regular semi-annual interest of 2½ per cent on the 5 per cent adjustment income bonds, payable April 1.

Offers Made for Railway Continuance.—Pelham, N. H., has offered a bonus of \$1,000 for the continuation of the 14 miles of car track from Nashua, N. H., to Pelham, which is to be abandoned by the Massachusetts Northeastern Street Railway. The Public

Service Commission offered the tracks, over the 14-mile section, to the Nashua Street Railway at the scrap price of \$3,000 per mile. The town of Hudson has offered \$20 a week for the thirty-six weeks of school for the transportation of the school children, to any company that will operate that section. To date no agreement has been made relative to these offers.

Approval of \$2,098,000 Issue Sought.—The Boston Elevated Railway has petitioned the Department of Public Utilities for approval of an issue of \$2,098,000 of thirty-year 6½ per cent bonds, to be used for refunding a bond issue of \$1,150,000, due March 1, and for construction and equipment.

Reported Purchase Price Agreed.—The sum of \$16,164 is said to have been agreed upon as the purchase price for the Athol & Orange division of the Northern Massachusetts Street Railway, for which community ownership is projected. A gang has been put to work tearing up the tracks on the line between Baldwinsville and Winchendon.

Hearing on Partial Abandonment Set.—There will be a hearing before Commissioner W. R. Pooley of the Public Service Commission at Buffalo on Feb. 1 on the proposal of the International Railway to abandon part of its lines in Niagara Falls. Hearing had been delayed at the request of the Niagara Falls authorities because of the recent change in administration in that city.

\$1,062,237 Net in Chicago in December.—For December the Chicago Surface Lines reports gross of \$5,007,901 and balance after expenses and taxes \$1,062,237. The surplus after joint account expenses and 5 per cent interest on purchase price was \$263,627, of which the city gets 55 per cent and the company 45 per cent.

Another Hearing on Consolidation Set.—A hearing was held recently on the application to the Board of Public Utility Commissioners of New Jersey for permission to consolidate electric railway lines, an electric company and a water company on the Jersey shore. Another hearing on the application is scheduled for Feb. 7 at the commission's office in Newark, N. J. The trolley lines to be merged are the Seashore Electric Railway, the West End & Long Branch Railway, the Seacoast Traction Company and the Asbury Park & Sea Girt Railroad.

\$2,000,000 of Gold Bonds Offered.—A syndicate headed by E. H. Rollins & Sons, New York, is offering \$2,000,000 of the first mortgage and refunding gold bonds of the Potomac Edison Company. The bonds, known as Series B, 6½ per cent, are offered at 97 and accrued interest to yield 6.75 per cent. They are dated May 1, 1923, and are due May 1, 1948. In addition to its lighting properties the company also operates or controls electric interurban railways in western Maryland and a part of Pennsylvania.

Traffic and Transportation

Eight Cents in Toledo

Filing of Higher Tariff Follows Commissioner's Rejection of Power Rate—Subsidy Considered

Posting of the second notice of a fare increase in the month of January by the Community Traction Company at Toledo, has brought the railway situation there to a crisis in which city officials, representatives of the company and citizens are taking part. The new raise will be effective on Sunday, Jan. 27, and will bring the fares to 8 cents cash, four tickets for 30 cents and 1-cent transfer charge. The increase was announced immediately following the breakdown of conferences between the Community Traction Company and Street Railway Commissioner W. E. Cann on the question of a new rate for power.

RATE FOR POWER IN DISPUTE

At the conclusion of the conference the company had offered through President B. C. Adams, who is also vice-president of the Toledo Edison Company, which furnishes the power, to reduce the rate from 1.6 to 1.4 cents per kilowatt-hour and modify coal clause provisions. These, it is estimated, would save the traction lines about \$90,000 to \$95,000 in its annual power bill. This had been rejected by the Street Railway Commissioner on the grounds that the traction company should have a better rate than the large industries of Toledo because of its long-term contract, steady demand and credit position.

Commissioner W. E. Cann has stated that under the sinking fund plan, intended as a means of long-term purchase of the traction properties by the city, the purchase of the lines would take 100 years. He says the sinking fund should be eliminated from the plan. The fund so far amounts to \$650,000. If this amount had been split between the stabilizing fund and maintenance he argued that fares would be lower and the property in better condition.

As another way out, but a radical one, the commissioner has suggested the city take over the lines under its option in the ordinance and operate them with a 2½-cent fare. The annual deficit from such operation would be about \$1,000,000, and this could be regarded as a ready-to-serve charge against the city to be raised by general taxation.

Present difficulties are attributed to the low-fare period at the beginning of operation under the ordinance, the slump in riding, the competition of buses and privately driven automobiles, rising labor costs and heavy maintenance necessary to keep the property

in fair operating condition. The stabilizing fund is now slightly in excess of \$60,000. The amount in the fund at the inception of the ordinance was \$400,000.

Bus Fares Increased in Milwaukee

Because of heavy increases in state and municipal taxation of buses, together with the cost of maintaining continuous high grade service, a readjustment of the bus fares by the Milwaukee Electric Railway & Light Company between Waukesha and Milwaukee became effective on Jan. 17. The cash fare between these two cities is 45 cents with a ticket rate of 43 cents. The ten-ride ticket with inbound transfer privilege in Milwaukee sells for \$3.50 and the ten-ride ticket with both inbound and outbound transfer privilege in Milwaukee at \$3.75. Effective that date, also, all forms of Waukesha-Milwaukee "Green" bus tickets were accepted on the Milwaukee Electric Railway & Light Company interurban cars between Waukesha and Milwaukee. A 40-cent ticket is also sold on the Milwaukee Electric Railway & Light Company interurban cars between Waukesha and Milwaukee. Formerly the cash fare on all buses between these two cities had been 40 cents, while a ten-ride ticket with inbound transfer privilege was \$3. The interurban ticket has been selling for 43 cents and is now reduced to 40 cents.

Railway Wants to Run Concourse Buses

The Third Avenue Railway, New York City, applied on Jan. 19 to the Board of Estimate, through S. W. Huff, its president, for the right to operate a bus line on the Grand Concourse, the Bronx, on a 10-cent fare, with free transfers to its crosstown surface lines in the Bronx. The application was made in the name of the Concourse Transportation Company, of which Mr. Huff is president.

The Third Avenue Railway now operates all the surface lines in the Bronx. It explains that in making the application in the name of the Concourse Transportation Company it is seeking an opportunity to give the people of the Bronx what will in effect be a single surface transportation unit "such as the borough is entitled to."

In justification of its application for a 10-cent fare the company says that it feels that the Leindorf bus operation, recently discontinued, must have demonstrated to the satisfaction of every one that a 5-cent fare will not sustain a satisfactory bus service on the Concourse, or, in fact, a bus service of any kind, satisfactory or otherwise.

Former Rates Restored

Wage Increase and Lack of Response by Riding Public Reduce Revenues of Connecticut Line

Specific figures have been made public by the Connecticut Company showing the need for the proposed increase on Feb. 1 in fare on its 500 miles of lines, referred to briefly in the *ELECTRIC RAILWAY JOURNAL* for Jan. 19, page 127. From June 1 to Dec. 31 the net income decreased \$585,000, or at the rate of \$1,000,000 a year. This decrease is attributed to the reduction in the token fare from three for 25 cents to two for 15 cents and the increase in the payroll charges.

As a matter of fact, the wage increase of last June has a most important bearing on the situation. The advance in pay at that time increased the payroll from June 1 to Dec. 31 by \$459,000 over the similar period in 1922. In percentages, this is a 9½ per cent increase over 1922, and amounts to a payroll increase of \$2,150 a day. The loss in revenue during last December as compared with December, 1922, was \$2,800 a day. This, coupled with an increase in payroll of \$2,150 a day, shows the condition before the company.

In 1922, after relief measures had been put into effect, particularly the regulation of severe jitney competition, the company was able to pay \$360,000 to the state on its back taxes, and in 1923 \$655,000 was paid on this particular item. In addition to this, current state taxes of \$840,000 were paid during the two-year period. In the matter of back taxes, due since the war period, there still remains to be paid to the state, however, about \$800,000.

In an effort to keep fares at the lowest possible point, the company made a voluntary decrease in the then existing rate of fare of 10 cents in March, 1922, by the introduction of the token fare, selling three tokens for 25 cents. At the time this was put into effect the trend of revenues under the 10-cent fare was upward, and the trend of wage rates and other costs of operation was downward.

Continued increase in riding and a reduction in rates of wages, together with numerous economies of operation, made possible another voluntary reduction in rate by the company, when, in April, 1923, the token rate was reduced to two for 15 cents. Since the latter date material increases in wage rates were made in June, 1923. This marked increase in payroll costs has resulted in an upward trend in expense of operation. The rate reduction of 10 per cent in April has resulted in a steady downward trend in revenues.

From June 1, the date of the wage increase, to Dec. 31, 1923, the decrease in revenue compared with the same period of 1922 was \$197,000, or 2 per cent. More passengers were carried than in the 1922 period, but not enough to offset the reduction in the token fare. If the decrease in revenue by months

is considered, however, the trend is readily perceived. The loss in revenue for November, 1923, compared with November, 1922, was \$41,000, or 4 per cent, and the loss for December, 1923, compared with December, 1922, was \$86,500, or 7 per cent. The decrease in December was at the rate of \$2,800 a day.

As more passengers were carried than during the same months of 1922, the company regards it as undesirable to economize any further by reduction in service.

The proposed change in fare is from the rate of two tickets for 15 cents to three for 25 cents.

Railway Presents Its Side at Atlanta

The Georgia Railway & Power Company, Atlanta, had its innings, on Jan. 15, at the second public hearing before the special committee appointed by the City Council to inquire into the plea of the company for a 10-cent fare. H. M. Atkinson, chairman of the board of directors of the company, told of some of the troubles confronting his company. He said that the New York banking interests, with which the company had always done business, had notified the company that they cannot advance another dollar for investment in the local railway until that department of the company had been put upon a stable and paying basis. He said:

This means that no more extensions can be built. Unless these extensions can be made, the city cannot expand, for no city will ever grow beyond the limits of its railway system. If the city cannot grow beyond the present limits of its railway, Atlanta can never reach its hoped-for 500,000 population. Unless we can get \$25,000,000 additional capital, the necessary extensions cannot be made. And unless we can show a reasonable return on capital now invested we cannot get that \$25,000,000. That much is evident.

According to Mr. Atkinson the company has actually been rendering railway service at less than cost for seven years. At last it has reached the end of its resources. He said that with a 7-cent fare, the company was only getting 2.7 cents per passenger in purchasing power as compared with 4.03 cents on a 5-cent fare in 1914.

Mr. Atkinson repeated his request for a 10-cent cash fare, a 2-cent charge for transfers, and the elimination of jitneys from the streets on which cars are operating as the means of putting the company on a paying basis, permitting the extensions to be made, and helping the growth of the city.

Five-Cent Fare Before General Assembly

The fight which was waged in Baltimore some time ago in an effort to force the United Railways & Electric Company to reduce its fare to 5 cents has been carried to the Maryland General Assembly. A bill has been introduced in the State Senate which provides 5 cents as the maximum fare. It seeks to add a new section to the law dealing with the Public Service Commission.

Weekly Pass and 10 Cents Cash in Pensacola

The Florida State Railroad Commission has granted the Pensacola Electric Company a revised fare schedule, effective Feb. 1. The 8-cent cash fare will be replaced by one of 10 cents, the price of the token will be kept at 7½ cents but on the basis of six for 45 cents instead of two for 15 cents, and an unlimited-ride transferable weekly pass will be added at \$1.25. The same pass will be valid on the Bay Shore division for which workmen's non-transferable tickets are provided at twelve for \$1.20; commutation tickets at ten for \$1.25; round-trip tickets for 30 cents and one-way cash for 20 cents. School tickets good only on school days remain at half the cost of adult fares provided they are purchased in books of ten tickets. The commission said:

The commissioners are of the opinion that a flat increase in fares is of doubtful expediency. We are impressed with the fact that a considerable amount of travel is being diverted from the railway by private automobiles, and it would seem that some schedule of fares that would encourage the more frequent riders to use the railway regularly and provide a more equitable charge for the casual or infrequent rider might increase riding and revenue. After investigation and consideration we have concluded that the so-called weekly pass, coupled with a proper token and cash fare, gives promise of affording additional revenue through stimulating travel, and at the same time prove more satisfactory to the public.

Jitneys Abolished in Houston—Railway to Spend \$1,500,000

At an election held on Jan. 19 an ordinance abolishing jitneys in Houston, Tex., effective on April 1, was carried by a vote of 9,238 to 4,594. This election was called as a result of a plan to settle Houston's transportation problem formulated by a group of citizens and accepted by both the Houston Electric Company and the city.

Jitneys came into existence in Houston in 1914. At one time their number reached 500, but recently there have been not more than 150 in service. The present jitney lines, except on one route, parallel the street railway lines and take care of only the short haul riders. The Houston Electric Company has been endeavoring to obtain relief from jitney competition in order that it might expand and improve its system. Failing to obtain such relief, the company carried its case to the federal courts.

John A. Beeler, New York, was employed by the city to make a thorough study of the Houston situation in order to defend the rate case in the federal court. In his report he stated that dual transportation was unfair and that the railway could not expand if throttled by such competition. He recommended that the jitneys be abolished and that the railway make certain changes in its system in order better to handle the traffic. After his report was made public a group of citizens formulated a plan embodying Mr. Beeler's recommendations, the principal provisions of which were the abolition of the jitneys and the expenditure by the Houston

Electric Company of approximately \$1,500,000 in the next three years.

This agreement was accepted by both the city and the Houston Electric Company. The Council then passed an ordinance abolishing the jitneys and submitted it to a vote for ratification. Three of the leading newspapers supported the proposition. The Citizens' Committee also carried on an extensive advertising campaign and held meetings in various sections of the city in order to explain the agreement and show the people the advantages of a railway system augmented by bus lines.

More Bus Lines Proposed for Philadelphia.—An ordinance was presented to the Council of Philadelphia on Jan. 17 authorizing the Philadelphia Rapid Transit Company to extend its bus service on Broad Street and from Frankford to Somerton, with an extension of the Roosevelt Boulevard line. The company also wants approval of an increase in its funded indebtedness to the amount of \$1,000,000 so as to finance the extension. The additional equipment needed will be 130 buses.

Increased Rates in Effect.—The Detroit United Railway, Detroit, Mich., recently filed with the State Public Utilities Commission a fare schedule increasing rates on three of its divisions from 2 cents a mile to 2½ cents. The change, which became effective on Jan. 10, is in accordance with a recent authorization by the commission. The company increased its fare on the line between Detroit and Toledo and between Detroit and Jackson from 2 to 2½ cents on Jan. 15.

Buses to Replace Railway.—The Wallkill Transit Company, Middletown, N. Y., operating the Middletown-Goshen trolley system of 13 miles, plans to replace all cars with buses in the spring. Seven buses will probably be purchased.

Independent Licenses Will Not Be Renewed.—At a hearing on Jan. 17, attended by independent bus owners, Mayor E. F. Leonard of Springfield, Mass., informed the bus men that he did not intend to renew bus licenses other than for the Springfield Street Railway after May. 1. He explained that he did not believe independent buses could compete against the railway without injury to the latter and consequent detriment to the public.

Six-Cent Fare Continuance Sought.—The Binghamton Railway, Binghamton, N. Y., has applied to the Public Service Commission for authority to continue the 6-cent fare in that city until Jan. 15, 1925. The Binghamton city authorities, by ordinance, have approved the extension of the 6-cent fare rate. The receiver claims that if the company had been compelled to operate on a 5-cent fare in 1923 it would have operated at a loss of \$80,000. One-man car operation has resulted in economies, but the employees have recently petitioned for an increase in wages.

Personal Items

Alexander McIver in Charge of Heavy Traction

Alexander McIver has been made supervisor of heavy traction developments of the Westinghouse Electric & Manufacturing Company.

He received the degree of bachelor of arts from the University of North Carolina, and then took the electrical engineering course at John Hopkins University, which he completed in 1895.

Mr. McIver assisted in the early work on the Sprague multiple-unit control and later helped to install this system on the South Side Elevated Railroad, the Brooklyn Rapid Transit Company and the Boston Elevated Railroad.

He was connected with the Chicago, North Shore & Milwaukee Railway as master mechanic. From this position he transferred to that of superintendent of equipment of the New York Railways—the consolidated surface lines of New York City.

Mr. McIver joined the Westinghouse forces in December, 1909. The electrification of the New York Terminal was then under way and Mr. McIver supervised the execution of Westinghouse contracts for this work. While making his headquarters in New York he supervised Westinghouse activities on the Long Island Railroad and the rapid transit and surface railroads in New York City as well.

At the inception of the Norfolk & Western electrification, Mr. McIver was appointed resident engineer in charge for the Westinghouse Company. Upon the completion of this important work he was appointed to a similar position on the Chicago, Milwaukee & St. Paul electrification.

Mr. McIver will make his headquarters at the East Pittsburgh works of the Westinghouse Company.

F. R. Phillips General Manager Pittsburgh Railways

F. R. Phillips has been made general manager of the Pittsburgh Railways to succeed the late P. N. Jones. Mr. Phillips is well known in the electric railway field. He was appointed acting general manager for the receivers at Pittsburgh in the early summer of 1923. At that time his career was briefly reviewed in the *ELECTRIC RAILWAY JOURNAL*. In December of last year, when Mr. Phillips was made head of the Pennsylvania Street Railway Association, a portrait and a biography of him were published in the *JOURNAL*.

George F. Atkinson has been reappointed assistant director of the Department of City Transit, Philadelphia. This announcement was made by Mayo Kendrick. Mr. Atkinson held the post under two former mayors.



H. B. Shaftoe

H. B. Shaftoe Vice-President and D. L. Waters Comptroller at Providence

The United Electric Railways, Providence, R. I., recently announced the election of H. B. Shaftoe as vice-president and the appointment of D. L. Waters as comptroller. Mr. Shaftoe will have charge of the financial, commercial and accounting departments of the company. He has risen steadily through the ranks of the company, having joined the property as a stenographer in 1902, when it was known as the Rhode Island Company. In 1920 he was made comptroller. He was holding this post when he was elected vice-president. The other vice-president of the company is E. J. Dickson. A sketch of his career was published in the *ELECTRIC RAILWAY JOURNAL* at the time he joined the company last summer.

Mr. Waters, the new comptroller, joined the United Electric Railways from the United States Railroad Administration offices in Washington,



D. L. Waters

where he was chief accountant in the comptroller's office. He began his career in 1903 with the Baltimore & Ohio Railroad, which company he served for nine years. While with that company he held the position of chief clerk to the division engineer, and later was accountant in the office of the auditor of disbursements. From 1912 to 1918 Mr. Waters was connected with the Delaware & Hudson Railroad, in the capacities of special accountant and chief clerk. He joined the United Traction Company, Albany, N. Y., in 1918 as auditor and assistant secretary. This position he resigned last year to accept the post of chief accountant in the comptroller's office of the United States Railroad Administration. There he remained until Jan. 1 of this year, when he left to go to Providence as comptroller of the 350 mile system in that city and adjoining territory.

C. O. G. Miller has been elected president of the Key System Transit Company, Oakland, Calif., the successor under reorganization to the San Francisco-Oakland Terminal Railways. Mr. Miller has long been connected as an officer and director with important business enterprises in Oakland, of which city he is a native.

Gordon Campbell, who terminated his fifteen-year presidency of the York Railways with the year 1923, as noted recently in *ELECTRIC RAILWAY JOURNAL*, intends to remain actively interested in public service, including the electric railway branch. This is said to correct any possible misinterpretation of the words "Gordon Campbell Retires" as used in the caption over the previous item, in which their use was intended to apply in a strictly local sense. As has been pointed out previously, Mr. Campbell's career has covered a wide range of activities in the public utility field and at York included the direction of a company that combined railway, electric light and power, steam heating and other activities.

W. R. Alberger has been elected vice-president and general manager of the Key System Transit Company, Oakland, Calif., the successor under reorganization to the San Francisco-Oakland Terminal Railways, with which he served in a similar capacity.

Obituary

Arthur W. Field, for nearly twenty years general sales agent of the Standard Motor Truck Company of Pittsburgh, died on Jan. 12, of pneumonia. Mr. Field was born in Providence, R. I., and early in his life was connected with the operating department of the Union Railway in that city. Then he was appointed Eastern sales agent and later vice-president of the Peckham Motor Truck & Wheel Company. He joined the forces of the Standard Motor Truck in 1905.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Rattan Used Extensively for Car Seats*

BY BERTRAM BERRY

Manager Sales Car Seat Department,
Heywood-Wakefield Company

Rattan is a vine growing sometimes more than 500 ft. long and is from $\frac{1}{2}$ in. to 2 in. in diameter. It has a long drooping leaf, similar to a palm leaf, and a thin bark covered with sharp thorns.

There are more than one hundred varieties of rattan. The best grades are gathered from higher altitudes and the greater part comes from Dutch Borneo. Rattan cut for the first time is always better quality than later cuts. Where the jungle has been cut over several times the sticks are likely to contain short joints. In a year the vine will grow about 10 ft. and will be about $\frac{1}{2}$ in. in diameter.

When harvesting rattan the natives first cut the vine about 3 ft. from the ground. After cutting over a small area the vine is allowed to dry for several days to permit the bark to loosen and the leaves to fall off. It is then pulled down and cut into lengths of 10 to 20 ft. so that it can be conveniently handled. These pieces are later pulled through a crotch or around the trunk of a tree to remove the bark and thorns. After the bark has been removed the rattan has a glossy appearance. This is caused by the enamel which covers the stick and is known as sega.

The rattan is carried to rivers and floated to the nearest trading post, where it is sold to Chinese merchants. River steamers take the rattan to Singapore. There it is washed with sand and water, graded and banded.

After reaching the United States the rattan is prepared for commercial purposes. Some of it is sold in cut lengths to the electric railways for snow sweepers, its toughness and elasticity lending itself admirably to this purpose. It is used also in a much smaller degree in schools for pointers and in other ways by some of the more aggressive teachers, the rattan resisting an impact when sometimes a wooden rule would break.

The bulk of the stock is split up into reed and cane by running the material through a machine fitted with a special knife which has radiating blades. The core, which is called "reed," passes through the center of the knife and the strands, which are split from the outside of the rattan, are called "cane."

*Abstract of a paper presented at the Mid-winter Meeting of the New York Electric Railway Association, New York, Jan. 21, 1924.

These strands are then run through a shaving machine, which planes the bottom and sides, thereby making the strand even in thickness and width. They are then counted and measured and the cane is put up in bunches to contain 1,000 ft. The reed is used in the manufacture of reed furniture, while the cane is used in the seats and backs of chairs as well as for furniture decorative purposes.

A large proportion of the cane, however, is woven into webbing for railway coach, electric car and bus seats. It is furnished with or without canvas lining and comes in rolls of approximately 200 lineal feet and in any width up to 48 in.

Before covering a seat or back cushion, the rattan car seat webbing is first placed in lukewarm water for about fifteen minutes to make it pliable. The canvas backing is not disturbed by wetting as the glue sets again when the webbing dries. The springs of the cushions are slightly compressed when upholstering, and after the rattan dries a neat job is the result.

When rattan is discolored from use, soap and water may be used to advantage and without damage. New strands may be woven in by hand where wear or burns have caused a break in the webbing. These strands should be inserted an inch or two away from the break and over the original strand. This is quite similar to and about as easy as the paper mat weaving taught children in kindergarten schools. After all of the new strands have been woven into place they should be pulled tight and then cut off close to a cross-strand. Rattan webbing is durable, cool, comfortable and sanitary.

Improvement Planned for Ottawa

The new franchise agreement recently approved by the people of Ottawa, Canada, for the Ottawa Electric Railway calls for the purchase of fifteen new cars during the first year, erection of a new carhouse, construction of about 5 miles of single track and a new substation, the whole entailing an expenditure of about \$600,000. Further improvements and extensions are arranged for each year during a five-year period in accordance with recommendations made to the city in 1922 by R. M. Feustel, traction expert. None of the work will be undertaken until the contract has been signed by the city and ratified by the Provincial and Dominion houses of Parliament. The total expenditure to be made for improvements under the five-year program is \$1,500,000.

Improvements to Cost \$685,000

A program of improvements for 1924 in St. Joseph, Mo., totaling \$685,000, is proposed by the St. Joseph Railway, Light, Heat & Power Company. Eighteen one-man cars will be put in service on the various lines, at an approximate cost of \$60,000. These cars will be rebuilt from a number which the company now has and will be equipped with modern devices. The company expects to spend between \$300,000 and \$350,000 for paving and new track construction. Improvements will be made at the carhouses costing about \$10,000.

Extensive improvements will also be made in the electric department involving an expenditure of from \$150,000 to \$200,000. An extension of the Wyatt Park car line to the municipal golf links will cost \$26,000, including paving.

Railways Use Fewer Castings

The total bookings of steel castings for 1923, according to the Department of Commerce, amounted to 868,019 tons, or 74.6 per cent of the capacity of the principal manufacturers. Of this amount, 380,000 tons were railway specialties and 488,019 tons were miscellaneous castings. Although in 1922 the total production was smaller, being only 785,059 tons, or 67.5 per cent of the production capacity, railway specialties were greater than last year, being 399,174 tons. In 1922 the bookings of miscellaneous castings amounted to 385,885 tons.

Study of Trade Catalogs

A study is now being made by a special committee of the Special Libraries Association of the United States, pertaining to trade catalogs, and information is desired as to what firms in this country keep a historical collection of trade catalogs. Information regarding this subject would be gratefully received by Lewis A. Armistead, librarian, Boston Elevated Railway, 31 St. James Avenue, Room 711, Boston 17, Mass.

Metal, Coal and Material Prices

Metals—New York	Jan. 22, 1924
Copper, electrolytic, cents per lb.	12.425
Copper wire base, cents per lb.	15.125
Lead, cents per lb.	8.025
Zinc, cents per lb.	6.82
Tin, Straits, cents per lb.	50.00

Bituminous Coal, f.o.b. Mines

Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$4.70
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons	2.00
Franklin, Ill., screenings, Chicago, net tons	1.95
Central, Ill., screenings, Chicago, net tons	1.55
Kansas screenings, Kansas City, net tons	2.25

Materials

Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$6.65
Weatherproof wire base, N. Y., cents per lb.	17.00
Cement, Chicago net prices, without bags	\$2.10
Linseed oil (5-bbl. lots), N. Y., per gal.	\$0.94
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.60
Turpentine, (bbl. lots), N. Y., per gal.	\$1.03

Rolling Stock

Bellows Falls & Saxtons River Street Railway, Bellows Falls, Vt., suffered by fire on Jan. 21 the loss of six cars, carhouses, electrical equipment, snow-plow and all machinery and stock for repair work. The main generator and two dynamos were made unfit for use and all cars burned except two that were in service on the road hauling freight. Rush orders have been put in for new equipment and service will be restored as soon as possible.

New Orleans Public Service, Inc., New Orleans, La., includes an expenditure of \$808,000 for new cars in its \$7,500,000 budget for 1924.

Altoona & Logan Valley Electric Railway, Altoona, Pa., in 1923 rebuilt nine double-truck cars into one-man cars.

Richmond Railroad, Staten Island, N. Y., has just ordered from the Osgood-Bradley Car Company twenty-five one-man, two-man, double-truck passenger cars with seating capacity of forty-four, built to the railway company's specifications. General Electric equipment will be supplied.

Los Angeles Railway, Los Angeles, Cal., as indicated previously in the *ELECTRIC RAILWAY JOURNAL*, has included in its expansion program of 1924 the purchase of 100 cars. The cars will be of the so-called "H" type, for operation in single units and two-car trains. These cars seat fifty-two passengers and have an inclosed section in the center and open sections on both ends. The company will construct twenty additional cars in its own shops. These cars will be of the so-called type "K," similar to the "H" type cars. The completion of the 1924 program will give 1,248 passenger cars.

Connecticut Company, New Haven, Conn., contemplates the purchase of four buses in the near future.

Houston Electric Company, Houston, Tex., in accordance with the ordinance agreement recently approved by the voters, will purchase fifteen double-truck cars during 1924. The cars will cost approximately \$12,000 each.

Texas Construction Company, Dallas, Tex., formed to electrify the Missouri, Kansas & Texas Railway from Dallas to Denton, has awarded contracts for six passenger cars and one express car to the American Car Company. The rolling stock will be built to specifications drawn by Richard Meriwether, vice-president of the Dallas Railway and vice-president of the Texas Construction Company. The passenger cars will be designed for either one-man or two-man operation.

Track and Line

Columbus Electric & Power Company, Columbus, Ga., plans improvements costing \$100,000 to be completed by March 1. The work includes the mov-

ing of the double tracks on Broadway between Twelfth and Fourteenth to the center, the trolley wires to be supported by one iron pole. It provides for the elimination of two long rows of old wooden poles. The street, which is the main thoroughfare of the city, is to be widened 6 ft. so as to make room for additional traffic. Following the completion of this improvement a similar program is scheduled for the lower Broad Street section, the two projects to cost near \$200,000.

Dallas Railway has been granted permission to construct an extension on the Eway and Seventh Street lines. The Eway Street line extension will be double-tracked at a cost of \$36,440 and the Seventh Street line will be extended at a cost of \$9,060.

Southern Indiana Gas & Electric Company, Evansville, Ind., plans to spend \$600,000 during 1924 for improvements. Of this amount \$185,000 will be used on expenditures in connection with trackwork. The program will be entered upon in the spring.

Trenton & Mercer County Traction Corporation, Trenton, N. J., has extended its service from Harney's Corner to Slackwood by laying an additional track. The company is also laying new switches, curves and other special work at the carhouse on Second and Davies Streets.

Altoona & Logan Valley Electric Railway, Altoona, Pa., in 1923 laid 8,341 ft. of new track, rebuilt 3,321 ft. and repaired 3,400 ft., laying 12,000 new ties.

Madison Railways, Madison, Wis., plans to build an extension of three or four blocks on University Avenue beyond Breese Terrace to handle extra cars for the accommodation of the increasing crowds at the University of Wisconsin football stadium and the stock pavilion.

Power Houses, Shops and Buildings

Louisville Railway, Louisville, Ky., has been busy for the past several months, in moving boilers, generators, turbines, etc., from its old power plant at Logan Street, to the big Riverside plant on the Ohio River, a comparatively new plant, in which its entire power equipment will be located.

Atlantic City & Shore Railroad, Atlantic City, N. J., is erecting a \$5,000 passenger station at Margate City.

Seattle, Wash.—Appropriation of \$2,583, one-half each from the water and railway department funds for installation of a negative feeder from the James Street substation to the new steel pipe line from Cedar Lake, the source of Seattle's water supply, is proposed by Superintendent George F. Russell of the water department. The experiment is planned to prevent disintegration of the steel from stray current from the municipal railway lines.

Trade Notes

Westinghouse Electric & Manufacturing Company, Pittsburgh, has announced the appointment of the Mann Electric Supply Company of Columbia, S. C., as its representatives in distributing electrical apparatus. With an increase of 11,000 sq.ft. in warehouse floor space, the new agent-jobbers are prepared to furnish reliable and efficient electrical service in South Carolina. They will carry a complete stock of motors, meters, transformers, line materials and other electrical equipment of Westinghouse company manufacture.

Hyman Michaels Company, Chicago, dealers in new and relaying rails, has placed Al Michaels, assistant treasurer, in charge of its Pittsburgh offices, located in the First National Bank Building. Mr. Michaels was formerly located in Chicago.

General Electric Company, Schenectady, N. Y., has created a Southwestern district to handle its apparatus business in Texas, Oklahoma, southern New Mexico and southeastern Arizona. The Southwest General Electric Company, as such, will continue to act as distributing jobber in the Southwestern district. C. W. Hobson has been appointed Southwestern manager, in general charge of General Electric business in that territory, and L. T. Blaisdell, district manager.

Harold F. Marshall, until recently advertising manager for Dwight P. Robinson & Company, Inc., engineers and constructors, left New York early in January to take up his new duties as advertising manager for Warren Webster & Company, engineers and manufacturers of steam heating systems.

New Advertising Literature

Ohio Brass Company, Mansfield, Ohio, has issued a pamphlet enumerating the five points of value in the new Ohio Brass ear. The pamphlet shows various sectional views of the trolley ear.

Chicago Motor Coach Company has issued an attractive booklet, "Place of the Motor Coach in a General Comprehensive Plan for Transportation in Chicago." The text was prepared by John A. Ritchie, president of the company, to show the importance of proper development of the use of a motor coach in Chicago.

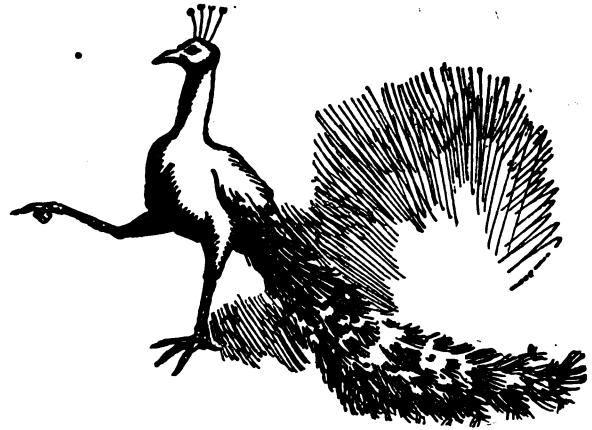
American Insulating Machinery Company, Philadelphia, has issued a new catalog on Aimco electric railway signals and crossing bells "for safety and efficiency."

Griscom-Russell Company, New York, N. Y., has issued Bulletin No. 1216, describing the U-fin air cooler to be used for cooling the air from generator windings by the use of turbine condensate.

**12 feet
of brake chain to wind!**

Impossible?—No!

PEACOCK STAFFLESS BRAKES



have this great chain-winding capacity

That is an abnormal amount, you say! Yes! But it's generally when abnormal conditions exist that accidents occur!

Having this ability to wind up almost unlimited lengths of chain, gives to Peacock Staffless Brakes that extra element of safety which insures satisfactory operation under the most abnormal conditions.

The ordinary capacity isn't enough!

Will the hand brakes on your cars prove effective when the rigging is slack and the brake shoes worn? The ordinary capacity isn't enough! You can wind the average hand brake up until it jams itself with chain, and still the brakes don't grip. But Peacock Staffless Brakes in this situation will quickly apply full braking power because they have ample room to wind up any amount of chain.



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DEVICES**Nuttall Sleet Wheels re-
place the standard trolley
wheels and efficiently
clean sleet coated wires.Nuttall Sleet Scrapers hook
over the trolley wheel—can
be attached instantly, and
clean the wire thoroughly.
Don't wait for a sleet storm—
order today.**R.D. NUTTALL COMPANY**
PITTSBURGH PENNSYLVANIAAll Westinghouse Electric & Mfg. Co.
District Offices are Sales Representatives
in the United States for the Nuttall Elec-
tric Railway and Mine Haulage Products.
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(WRITE TO THE AUDIT BUREAU OF CIRCULATIONS, 202 SOUTH STATE STREET, CHICAGO, FOR A COPY OF “THE MEASURE OF YOUR MESSAGE”)

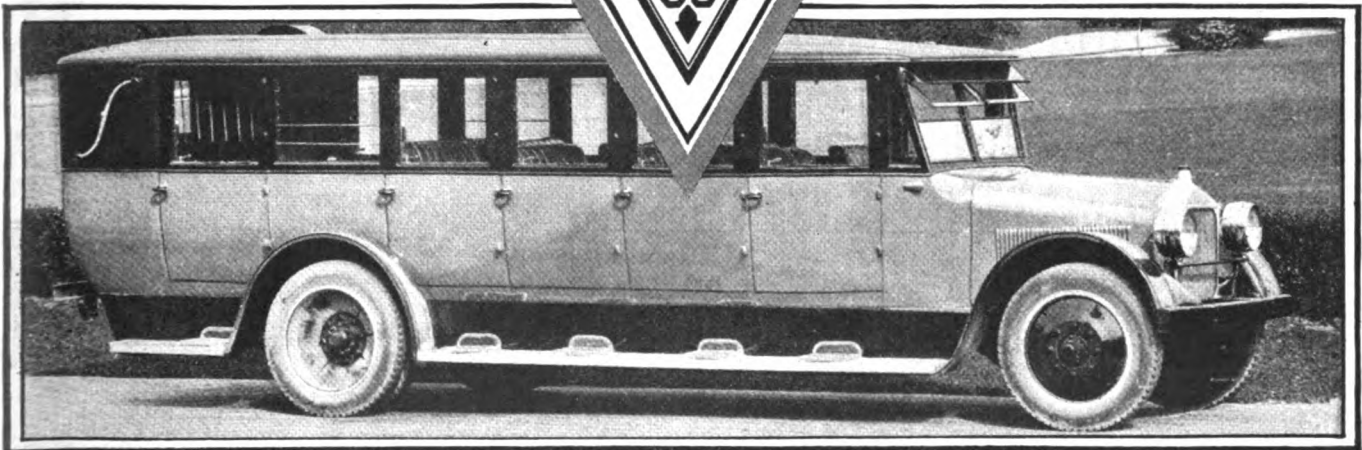
TIMKEN

The Motor Coach Has Made Good

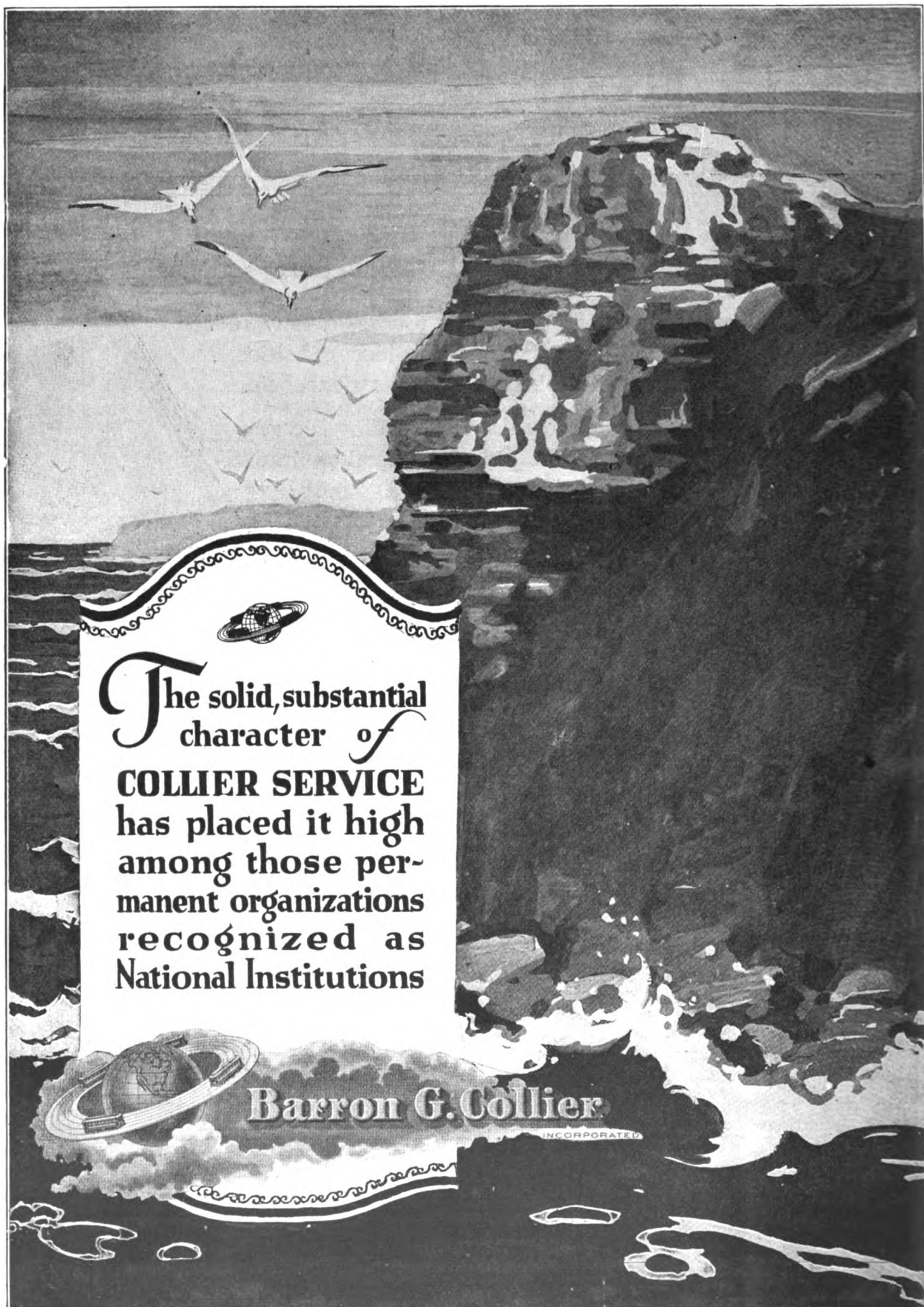
A new outlet for the small towns, a new feeder for the railways, a new builder of cities, it creates traffic where there was none before.

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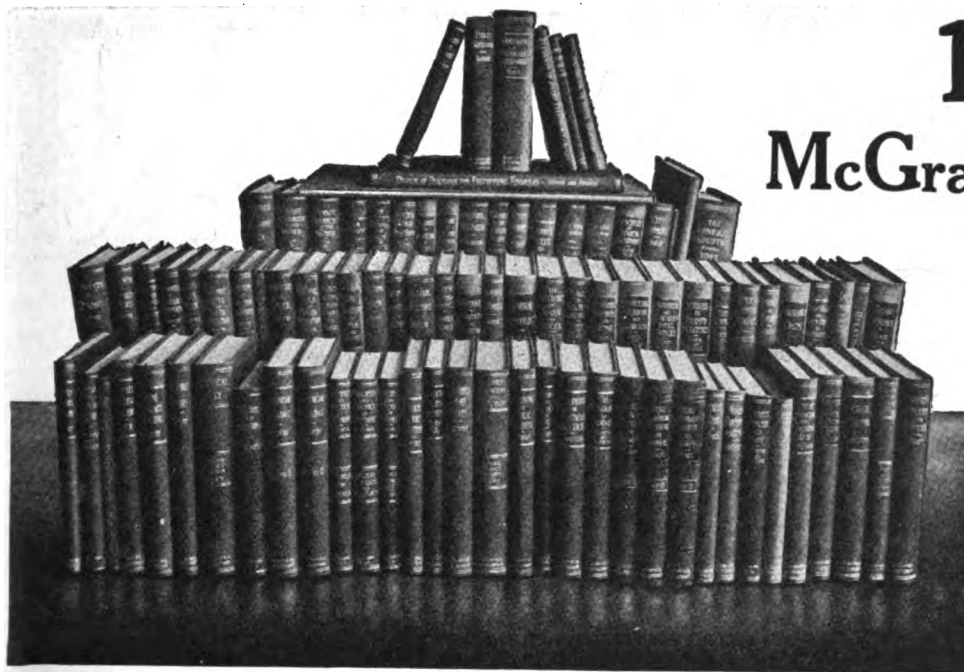


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has placed it high
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Barron G. Collier
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1923

McGraw-Hill Books

During 1923, we published 89 new books, including 12 revised editions of standard works. These books are shown in the accompanying illustration.

It is not so much the number of our new books that we speak of, however, as the character and variety of these books.

The books listed below range all the way from practical books for the operator to advanced and specialized treatises for the engineer—from books on business to books on scientific agriculture.

Throughout, we believe they maintain the high standard of McGraw-Hill books. They represent the best in the new literature of applied science and business.

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Agriculture and Biology			
Carrier—Beginnings of Agriculture in America	3.00		
Lohnie and Fred—Textbook of Agricultural Bacteriology	3.00		
Mitchell—Textbook of General Physiology	6.00		
Piper and Morse—The Soybean	4.00		
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Thompson—Vegetable Crops	4.50		
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Hamilton—Elementary Thermodynamics of Automobile Engines	3.00		
Huebner—Mechanics of the Gasoline Automobile	4.00		
White—Motor Transportation of Merchandise and Passengers	4.00		
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Wright—Farm Mortgage Financing	3.00		
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Hoffman—Public Speaking for Business Men	2.50		
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Mahin and Carr—Quantitative Agricultural Chemistry	2.75		
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Dingman—Estimating Building Costs	2.50		
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Rolling Stock

Bellows Falls & Saxtons River Street Railway, Bellows Falls, Vt., suffered by fire on Jan. 21 the loss of six cars, carhouses, electrical equipment, snowplow and all machinery and stock for repair work. The main generator and two dynamos were made unfit for use and all cars burned except two that were in service on the road hauling freight. Rush orders have been put in for new equipment and service will be restored as soon as possible.

New Orleans Public Service, Inc., New Orleans, La., includes an expenditure of \$808,000 for new cars in its \$7,500,000 budget for 1924.

Altoona & Logan Valley Electric Railway, Altoona, Pa., in 1923 rebuilt nine double-truck cars into one-man cars.

Richmond Railroad, Staten Island, N. Y., has just ordered from the Os-good-Bradley Car Company twenty-five one-man, two-man, double-truck passenger cars with seating capacity of forty-four, built to the railway company's specifications. General Electric equipment will be supplied.

Los Angeles Railway, Los Angeles, Cal., as indicated previously in the *ELECTRIC RAILWAY JOURNAL*, has included in its expansion program of 1924 the purchase of 100 cars. The cars will be of the so-called "H" type, for operation in single units and two-car trains. These cars seat fifty-two passengers and have an inclosed section in the center and open sections on both ends. The company will construct twenty additional cars in its own shops. These cars will be of the so-called type "K," similar to the "H" type cars. The completion of the 1924 program will give 1,248 passenger cars.

Connecticut Company, New Haven, Conn., contemplates the purchase of four buses in the near future.

Houston Electric Company, Houston, Tex., in accordance with the ordinance agreement recently approved by the voters, will purchase fifteen double-truck cars during 1924. The cars will cost approximately \$12,000 each.

Texas Construction Company, Dallas, Tex., formed to electrify the Missouri, Kansas & Texas Railway from Dallas to Denton, has awarded contracts for six passenger cars and one express car to the American Car Company. The rolling stock will be built to specifications drawn by Richard Meriwether, vice-president of the Dallas Railway and vice-president of the Texas Construction Company. The passenger cars will be designed for either one-man or two-man operation.

Track and Line

Columbus Electric & Power Company, Columbus, Ga., plans improvements costing \$100,000 to be completed by March 1. The work includes the mov-

ing of the double tracks on Broadway between Twelfth and Fourteenth to the center, the trolley wires to be supported by one iron pole. It provides for the elimination of two long rows of old wooden poles. The street, which is the main thoroughfare of the city, is to be widened 6 ft. so as to make room for additional traffic. Following the completion of this improvement a similar program is scheduled for the lower Broad Street section, the two projects to cost near \$200,000.

Dallas Railway has been granted permission to construct an extension on the Eway and Seventh Street lines. The Eway Street line extension will be double-tracked at a cost of \$36,440 and the Seventh Street line will be extended at a cost of \$9,060.

Southern Indiana Gas & Electric Company, Evansville, Ind., plans to spend \$600,000 during 1924 for improvements. Of this amount \$185,000 will be used on expenditures in connection with trackwork. The program will be entered upon in the spring.

Trenton & Mercer County Traction Corporation, Trenton, N. J., has extended its service from Harney's Corner to Slackwood by laying an additional track. The company is also laying new switches, curves and other special work at the carhouse on Second and Davies Streets.

Altoona & Logan Valley Electric Railway, Altoona, Pa., in 1923 laid 8,341 ft. of new track, rebuilt 3,321 ft. and repaired 3,400 ft., laying 12,000 new ties.

Madison Railways, Madison, Wis., plans to build an extension of three or four blocks on University Avenue beyond Breese Terrace to handle extra cars for the accommodation of the increasing crowds at the University of Wisconsin football stadium and the stock pavilion.

Power Houses, Shops and Buildings

Louisville Railway, Louisville, Ky., has been busy for the past several months, in moving boilers, generators, turbines, etc., from its old power plant at Logan Street, to the big Riverside plant on the Ohio River, a comparatively new plant, in which its entire power equipment will be located.

Atlantic City & Shore Railroad, Atlantic City, N. J., is erecting a \$5,000 passenger station at Margate City.

Seattle, Wash.—Appropriation of \$2,583, one-half each from the water and railway department funds for installation of a negative feeder from the James Street substation to the new steel pipe line from Cedar Lake, the source of Seattle's water supply, is proposed by Superintendent George F. Russell of the water department. The experiment is planned to prevent disintegration of the steel from stray current from the municipal railway lines.

Trade Notes

Westinghouse Electric & Manufacturing Company, Pittsburgh, has announced the appointment of the Mann Electric Supply Company of Columbia, S. C., as its representatives in distributing electrical apparatus. With an increase of 11,000 sq.ft. in warehouse floor space, the new agent-jobbers are prepared to furnish reliable and efficient electrical service in South Carolina. They will carry a complete stock of motors, meters, transformers, line materials and other electrical equipment of Westinghouse company manufacture.

Hyman Michaels Company, Chicago, dealers in new and relaying rails, has placed Al Michaels, assistant treasurer, in charge of its Pittsburgh offices, located in the First National Bank Building. Mr. Michaels was formerly located in Chicago.

General Electric Company, Schenectady, N. Y., has created a Southwestern district to handle its apparatus business in Texas, Oklahoma, southern New Mexico and southeastern Arizona. The Southwest General Electric Company, as such, will continue to act as distributing jobber in the Southwestern district. C. W. Hobson has been appointed Southwestern manager, in general charge of General Electric business in that territory, and L. T. Blaisdell, district manager.

Harold F. Marshall, until recently advertising manager for Dwight P. Robinson & Company, Inc., engineers and constructors, left New York early in January to take up his new duties as advertising manager for Warren Webster & Company, engineers and manufacturers of steam heating systems.

New Advertising Literature

Ohio Brass Company, Mansfield, Ohio, has issued a pamphlet enumerating the five points of value in the new Ohio Brass ear. The pamphlet shows various sectional views of the trolley ear.

Chicago Motor Coach Company has issued an attractive booklet, "Place of the Motor Coach in a General Comprehensive Plan for Transportation in Chicago." The text was prepared by John A. Ritchie, president of the company, to show the importance of proper development of the use of a motor coach in Chicago.

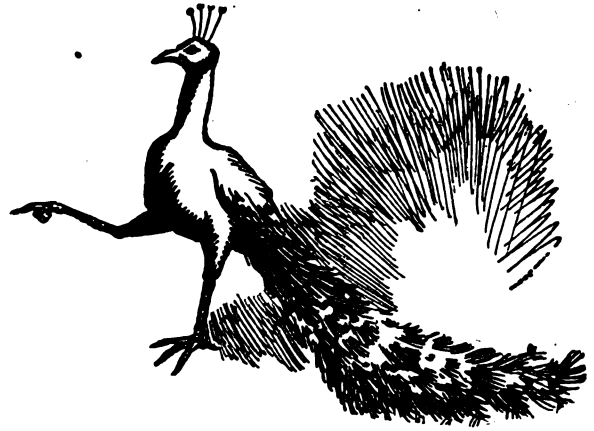
American Insulating Machinery Company, Philadelphia, has issued a new catalog on Aimco electric railway signals and crossing bells "for safety and efficiency."

Griscom-Russell Company, New York, N. Y., has issued Bulletin No. 1216, describing the U-fin air cooler to be used for cooling the air from generator windings by the use of turbine condensate.

**12 feet
of brake chain to wind!**

Impossible?—No!

PEACOCK STAFFLESS BRAKES



have this great chain-winding capacity

That is an abnormal amount, you say! Yes! But it's generally when abnormal conditions exist that accidents occur!

Having this ability to wind up almost unlimited lengths of chain, gives to Peacock Staffless Brakes that extra element of safety which insures satisfactory operation under the most abnormal conditions.

The ordinary capacity isn't enough!

Will the hand brakes on your cars prove effective when the rigging is slack and the brake shoes worn? The ordinary capacity isn't enough! You can wind the average hand brake up until it jams itself with chain, and still the brakes don't grip. But Peacock Staffless Brakes in this situation will quickly apply full braking power because they have ample room to wind up any amount of chain.



Peacock Staffless Brakes

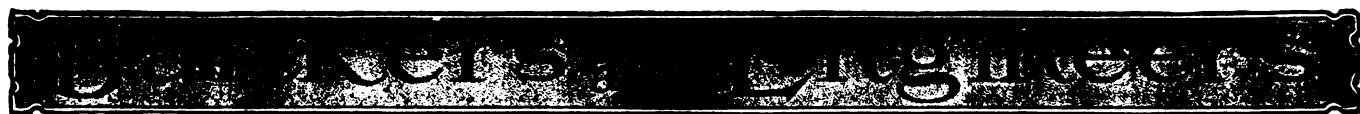
Test it out on your own cars!

National Brake Co., Inc.

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pass. Campaigns handled to make it a success.

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place the standard trolley
wheels and efficiently
clean sleet coated wires.Nuttall Sleet Scrapers hook
over the trolley wheel—can
be attached instantly, and
clean the wire thoroughly.
Don't wait for a sleet storm—
order today.**R.D. NUTTALL COMPANY**
PITTSBURGH PENNSYLVANIAAll Westinghouse Electric & Mfg. Co.
District Offices are Sales Representatives
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The publisher with space to sell submits the facts about his business in the form of a statement to the Audit Bureau of Circulations. This statement after it is checked, approved or audited by the Bureau is used to place the publisher’s wares before the Advertiser who is buying space.

The Advertiser knowing the thoroughness of A. B. C. methods safely bases his decision on the Verified Facts contained in the A. B. C. report.

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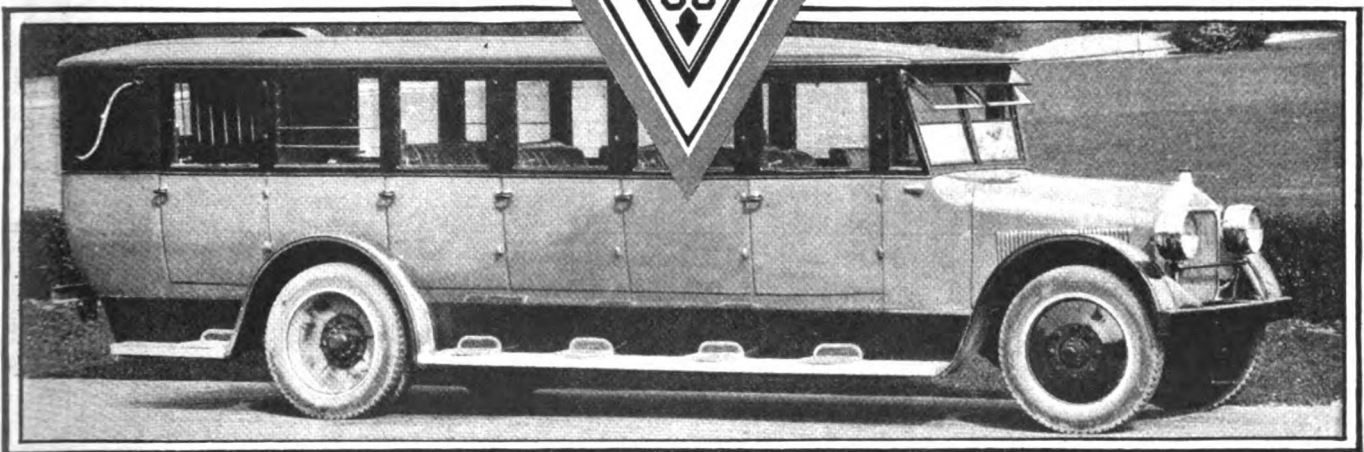
TIMKEN

The Motor Coach Has Made Good

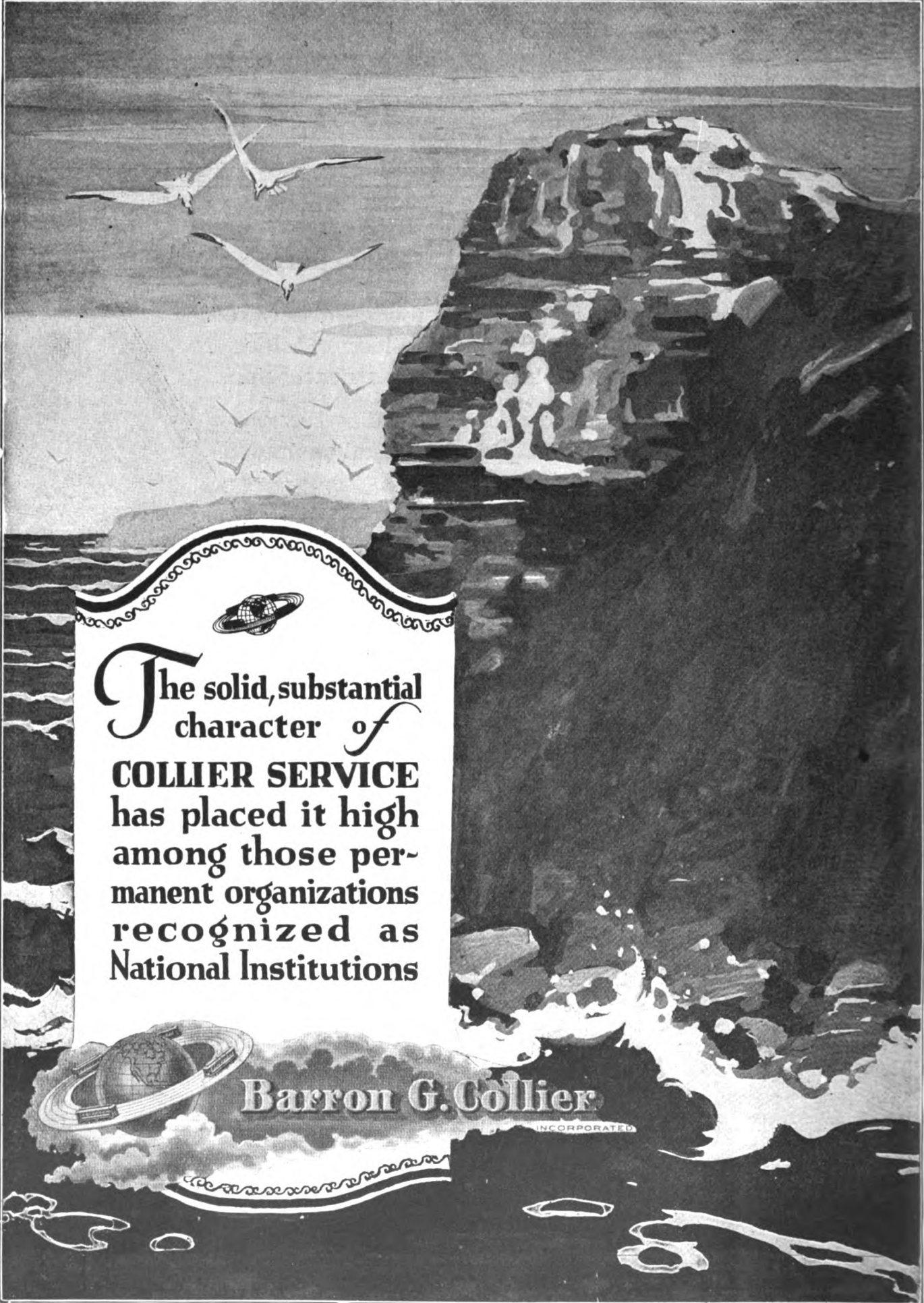
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COLLIER SERVICE
has placed it high
among those per-
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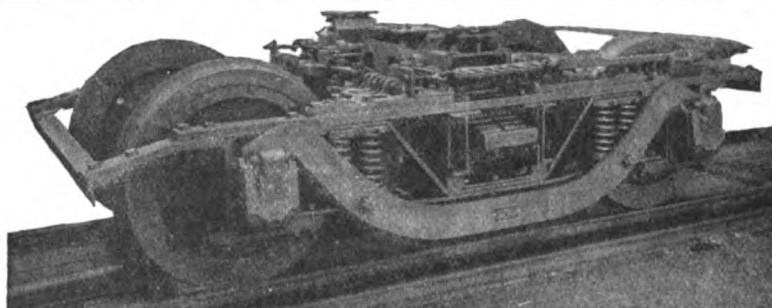
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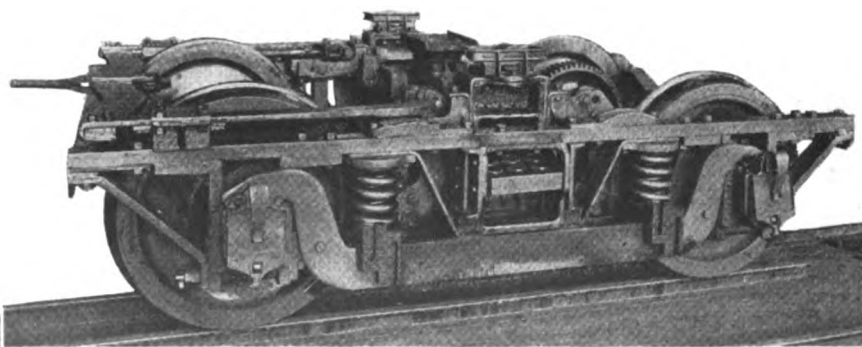
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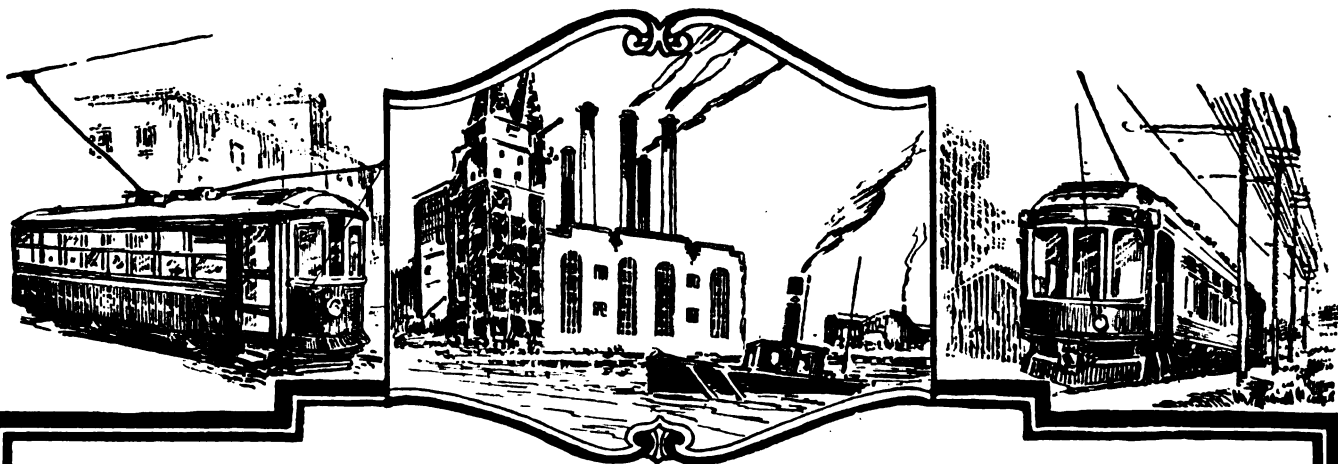
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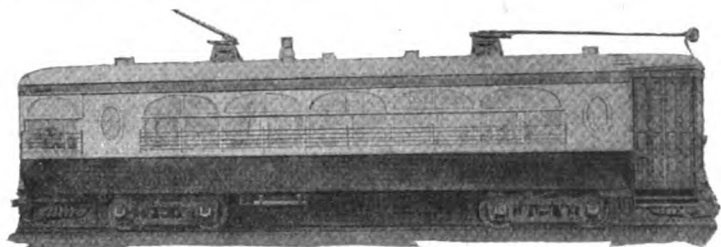
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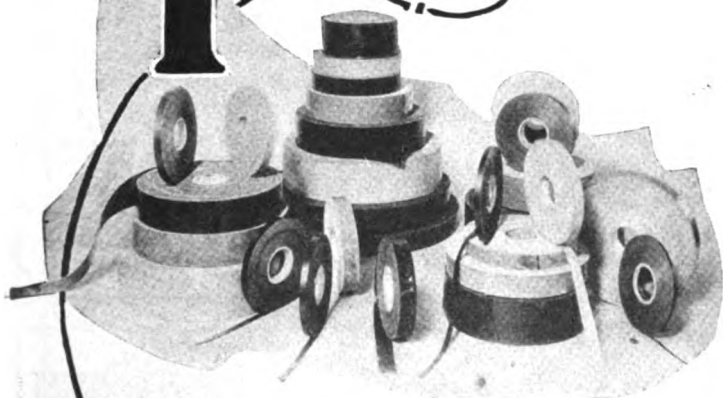
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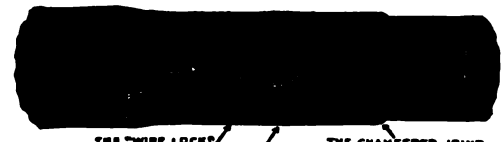
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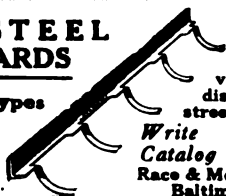
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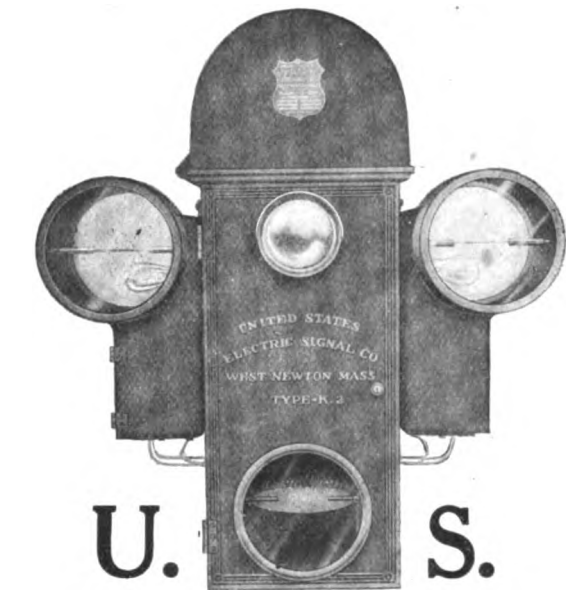
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Eliminate from track assemblage all Spikes, plates, anchors, braces,
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REVOLUTIONIZES ROADBEDS

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Are made to meet every
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Electrical Machinery, Steam Turbines, Steam Engines,
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FOR CUTTING, WELDING, ETC.
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High-grade R. R. Track and Car Jacks

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We are at all times interested in the purchase of entire issues of Bonds, Notes or Preferred Stock of Electric Light and Power, Water or Gas Companies; also in the purchase of blocks of escrow securities.

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For Every Class of Service

General Offices and Works: Philadelphia
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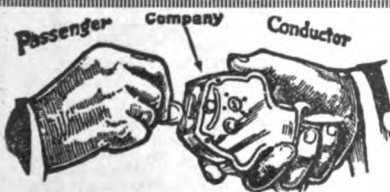


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Heywood-Wakefield CAR SEATS

of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.

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Brake Shoes A.E.R.A. Standards

Diamond "S" Steel Back is the Best Type



Standard
Patterns

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SAFETY
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D-67 for Narrow Treads
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American Brake Shoe and Foundry Co.
30 Church Street, New York

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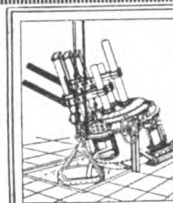


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FORGED STEEL AXLES

For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or
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Moore Rapid
Electromelt
Furnaces
Ten Standard Sizes Up to 24 Tons Capacity
Most Rapid and efficient for making
Tool Steels, Alloy Steels, Forging Steels
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CHILLINGWORTH

One-Piece Gear Cases
Seamless—Elvotless—Light Weight
Best for Service—Durability and
Economy. Write Us.

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"Boyerized" Products Reduce Maintenance

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Case Hardened Brake Pins
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Case Hardened Nuts and Bolts
Manganese Brake Heads
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Bronze Axle Bearings
Bemis Pins are absolutely smooth and true in diameter. We
carry 40 different sizes of case hardened pins in stock. Samples
furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

"Opportunity"
Advertising:

Think "SEARCHLIGHT" First!

0098



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ROADMASTER wanted for electric road in the East. Must be thoroughly efficient in the handling of material and labor and competent in the maintenance of city and interurban track. State experience, salary expected and when available. P-648, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SALES engineer wanted, familiar with steam and street railway special track work, capable of securing field data for the manufacture of same. Must have had experience with manufacturer of special track work. State experience, approximate salary, age and education. P-643, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

ACCOUNTANT—Eighteen years' experience in electric railway and light accounting. Well versed in I. C. C. and State accounting requirements. Familiar with detail work of accounting department and able to get results. Can assume charge of general office or relieve busy executive of detail work. Age 37, married. Excellent references, moderate salary. PW-645, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

CAN you place a technical graduate on your staff in charge of equipment, distribution, traffic and transportation, or as divisional executive? Am 37 years of age, nicely connected with non-operating company but wish to get into actual operation. Have had operation, manufacturing and installation of railway and power. Up for your consideration. PW-636, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SECRETARY to executive man, with seven years' experience in electric railway industry. 25 years of age, good education, good appearance, willing worker. PW-647, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation, at present with large property, solicits correspondence with managers that are in the field for a superintendent of wide experience. Capable progressive and recognized as an economical painstaking official. High-grade references. Personal reasons for desiring a change. PW-638, Electric Railway Journal, Leader-News Building, Cleveland, Ohio.

SUPERINTENDENT, nine years' railway and some lighting experience, desires correspondence with managers wishing the services of a capable, efficient, energetic, official. Will consider position in West Indies. PW-642, Electric Railway Journal, 10th Ave. at 36th St., New York.

AGENTS AND SALESMEN

Wanted Manufacturers Agent or Salesman Preferably located near New York. Must be acquainted with electrical engineers, road and line superintendents of electric railways to sell established line of fittings with exclusive territory and liberal commissions. AS-646, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

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be careful to put on envelope the key number in the ad and also local address of office to which reply is sent.

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0195

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For street and interurban railway wheels up to 36-in. diameter. Must be in good condition.

W-644, Electric Railway Journal
1570 Old Colony Bldg., Chicago, Ill.

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96—WH-101B2

RAILWAY MOTORS

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501 Fifth Ave., New York

FOR SALE

50—G. E. No. 80-A Motors.
50—Controllers, K-28-B; K-12.
35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
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RAILWAY MOTORS

2—Unused General Electric, type 210-H.
50% of market price.

GEORGE SACHSENMAIER CO.
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3000 TONS 70 LB. ASCE

First Class

RELAYING RAILS

With angle Bars
Also other Weights. Immediate shipment.

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Cars, Locomotives, Piling, Tanks, etc.

Good Relaying Rails

Are as Serviceable as New Rails, with a Big Saving on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

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531 Peoples Gas Bldg., Chicago
OFFICES AND PLANTS AT
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RELAYING RAILS

80 and 90 lb.

Full complement of Angle Bars. Shipment January and February, 1924.

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Phone Olive 3654

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FOR SALE

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Rensselaer, N. Y.

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(Absolutely New)

Just a Few Left at Sacrifice Prices
For Quick Disposal

No. 2 Carbic Lights \$25.00
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Hippodrome Milburn 30.00

Orders filled promptly while they last.
Send for our "Bargain Price Circular"
Listing Hardware, Valves & Fittings, Tools,
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JONES-McKEE, Inc.
596 Broadway, New York, N. Y.

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
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Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch
Stands
Ramapo Ajax Corp.
Automatic Safety Switch
Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.
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Timken-Detroit Axle Co.
Axles (front & rear), Motor
Truck and Passenger
Timken-Detroit Axle Co.
Axles, Trailer
Timken-Detroit Axle Co.
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Bearings, Center and Boiler
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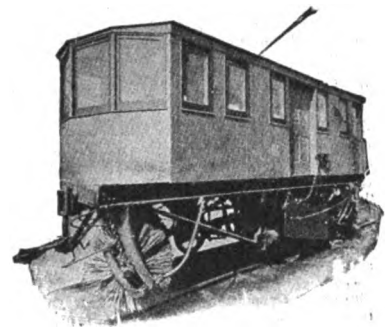
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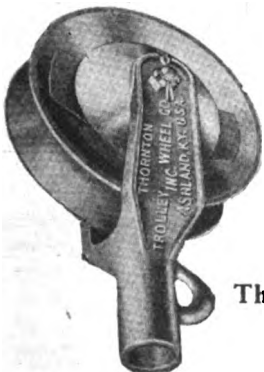
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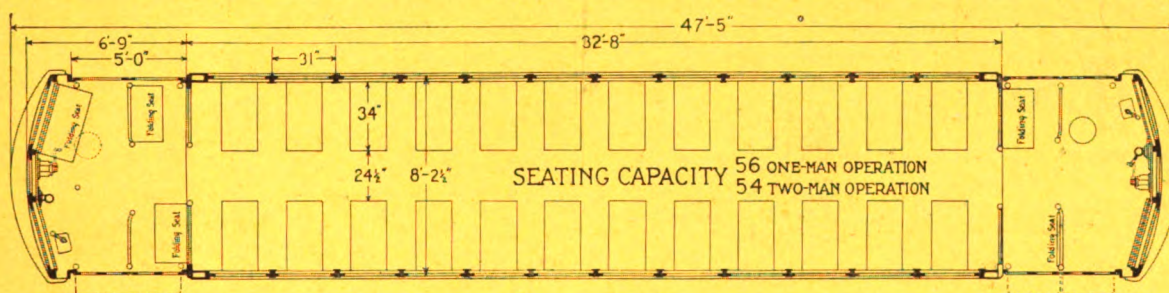
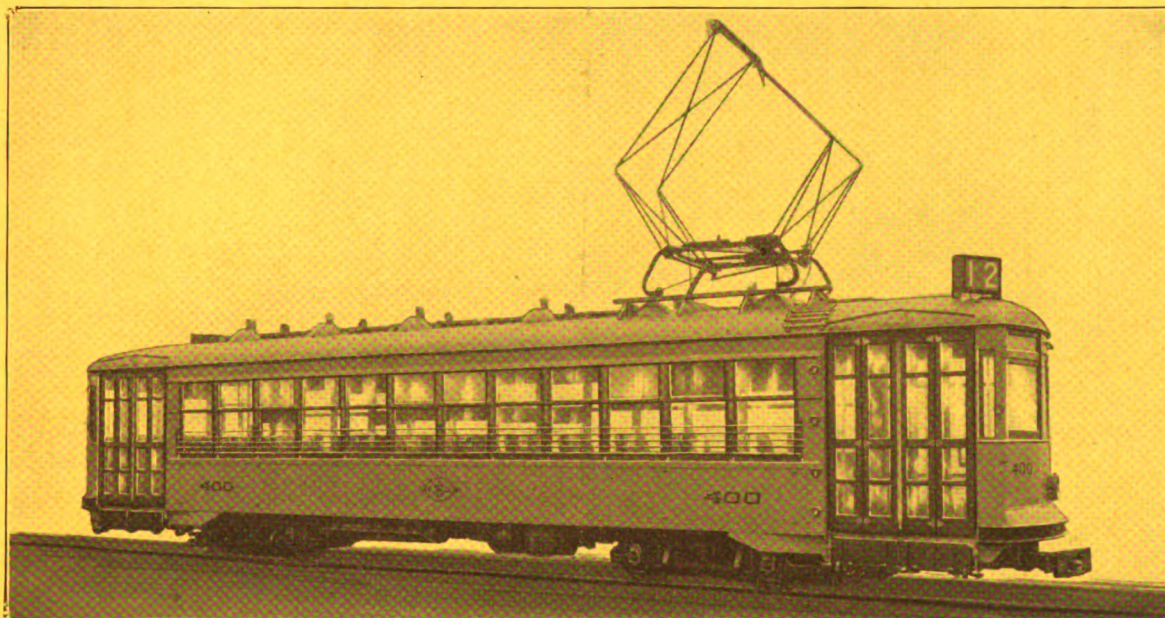
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For further information see the January issue of Brill Magazine.



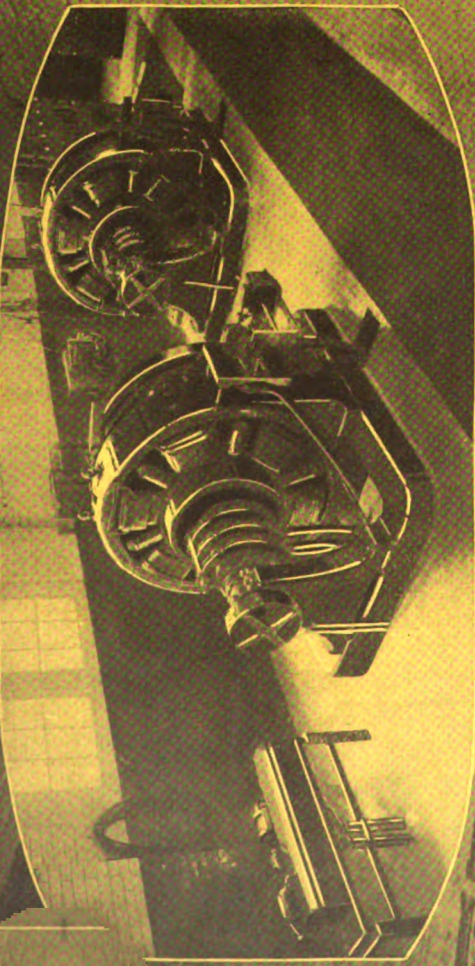
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Used by the Medal Winner, too

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Some of the larger users of 532-type motors:

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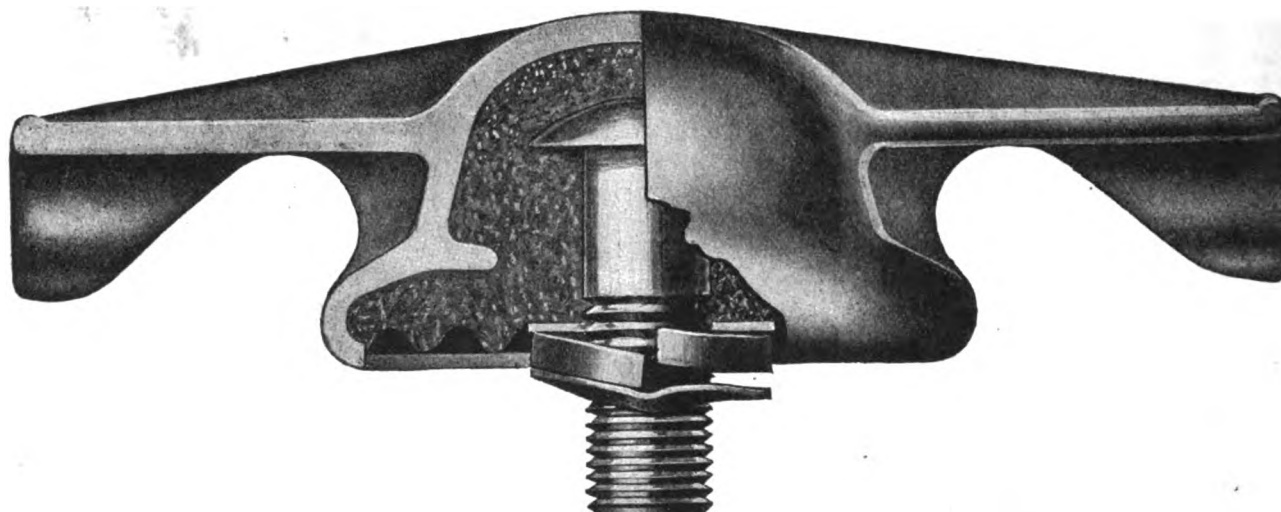
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Excision of the Superfluous

LAST week in this column we spoke of our efforts to save the reader's time. Since then a letter has come in from a subscriber who states concisely what we tried to convey. We excerpt from his letter:

"Enclosed find check for \$4 for one year's subscription to ELECTRIC RAILWAY JOURNAL. Through the kindness of Mr. — I received two copies—Dec. 13 and 22, and read them with profit and enjoyment. They are practical, up to date and concise. I think that you are especially to be commended for conciseness. Many business and trade magazines are too wordy."

"Brevity is the soul of wit," we are told; but conciseness is even more. And we cannot miss the opportunity to note especially the words in this letter—"practical" and "up to date." For it is by its practical value to the railway man that the editors are judging what shall go into the paper and how much.

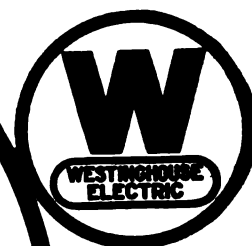


The Lock Washer Assures A Tight Fit

The Type B-1 Suspension

is similar to our well-known Type B straight line suspension, except that the stud is longer and is fitted with a lock washer held in a recess by a thin copper washer. This enables the ear to be aligned accurately, without "backing it off the stud," thereby always assuring a tight connection between the suspension and the ear. The lock washer will not become loose.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.



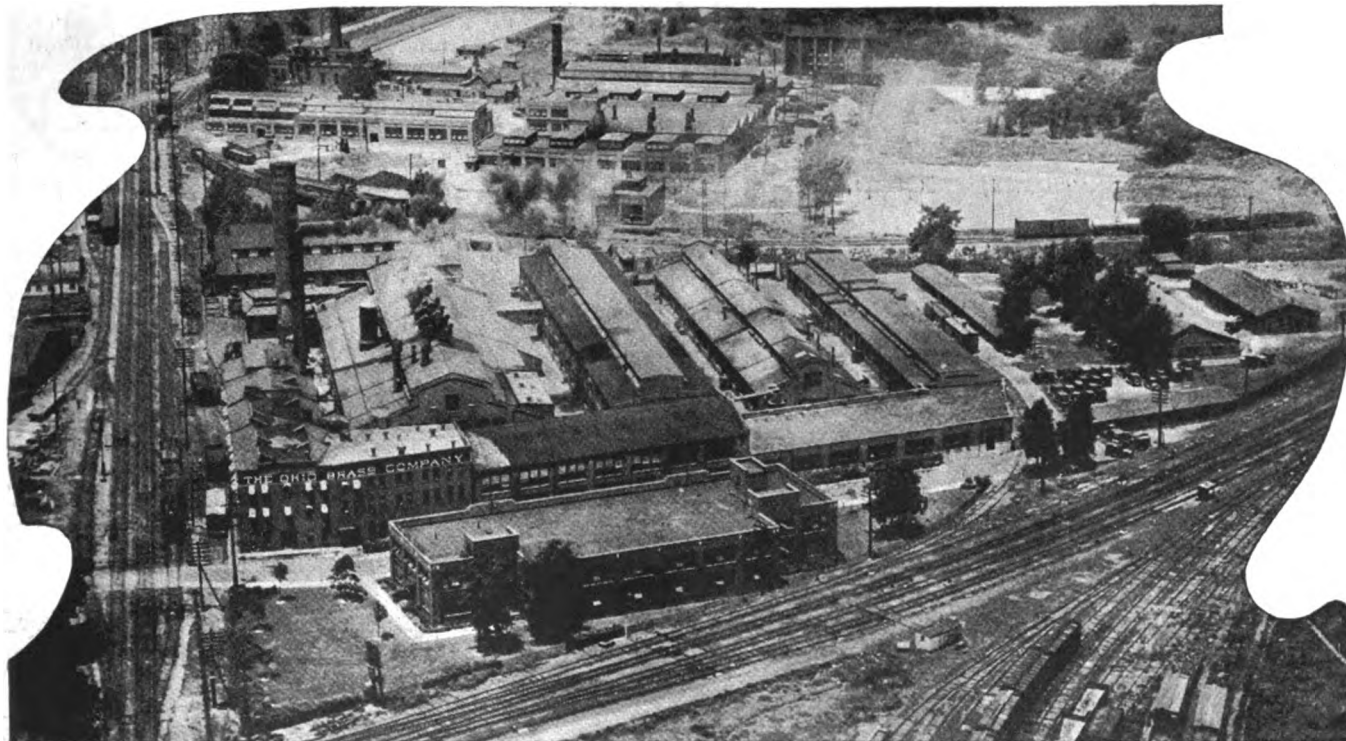
Westinghouse

The Home of

B

THE plant and main offices of O-B at Mansfield, Ohio are impressive not because of extraordinary size but because they illustrate a substantial growth based on a 35-year policy of providing materials made by up-to-date methods — with up-to-date facilities — by efficient contented workmen and distributed by an organization anxious to give wide-awake service.

An honest desire to serve the industry through these mediums of up-to-date facilities and conscientious personnel is ever an O-B intention. The main plant at Mansfield is evidence of the success of this idea.



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“Wild Geese are Flying North”

SO says a newspaper report from New England, pointing to various signs of early spring—a flying start, as it were.

How about a flying start for the track maintenance crews? For example—taking stock of your grinding and welding equipment and supplies.

We are ready for quick action now. Later on we may be swamped.

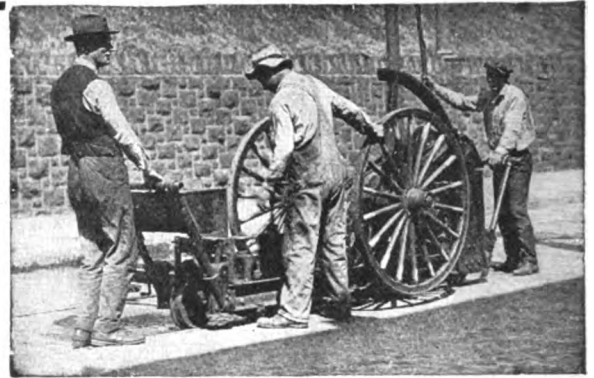
Bulletins if you haven't all the facts — they're ready now.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

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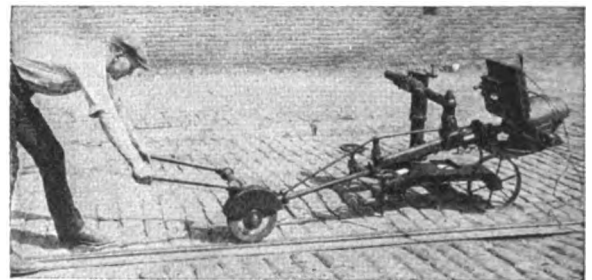
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“Reciprocating” Track Grinder



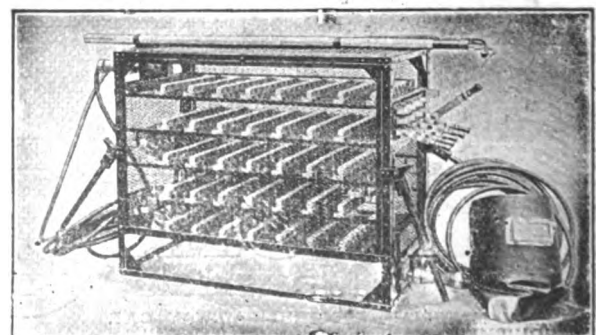
“Universal” Rotary Track Grinder



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“Atlas” Ball Grinder



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Let us send you working plans with itemized costs and some interesting records of Twin Ties in actual use

Questions from Inquiries on Steel Twin Ties which are answered in our Folder on Steel Tie Construction:

How much concrete is placed underneath the bottom of the channels?

Is it customary to use Tie rods when a 7-in. grooved section is used?

Please send construction details and costs relating to concrete steel Tie construction.

I would be glad for you to submit information on itemized costs and track plans for Twin Tie construction.

We have about one-half mile of track on which we wish to use Steel Ties—how many will we require?

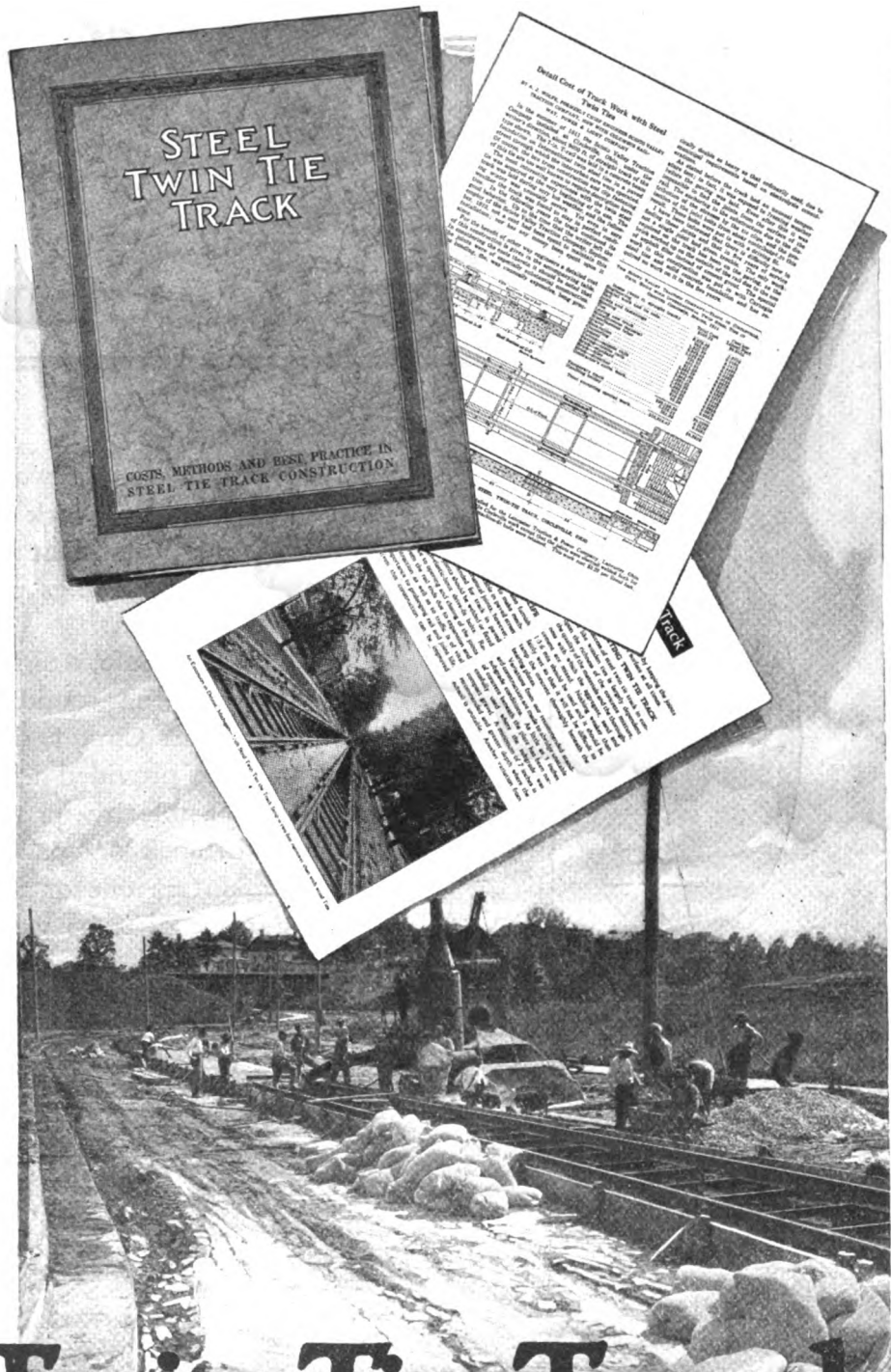
Will you, therefore, indicate on the enclosed print proper spacing of your Ties to make a perfectly secure job?

Please give us a quotation on approximately 800 Twin Ties complete with fastenings to be used with 75-lb. standard A.S.M.E. Rail in Pavement.

Without obligating us would be glad to consider your method of reconstruction on old concrete base.

**The International
Steel Tie Company**
Cleveland, Ohio

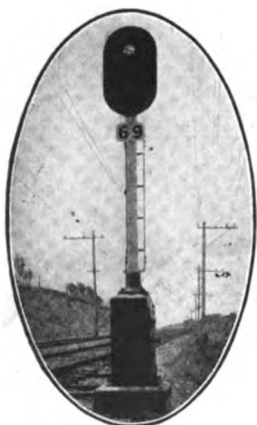
Canadian Representatives
**Sarnia Bridge Company,
Limited**
Sarnia, Ontario



Steel Twin Tie Track



Illinois Traction Company

Public Service Railroad
of New JerseyPhiladelphia Rapid Transit
CompanyChicago, Milwaukee &
St. Paul RailwayWashington, Baltimore &
Annapolis Electric RailroadKansas City, Clay County
& St. Joseph Railway

Public Confidence

IS ASSURED to Railways equipped with Union Automatic Block Signaling Systems. Return on the investment is secured by the direct and indirect savings produced.

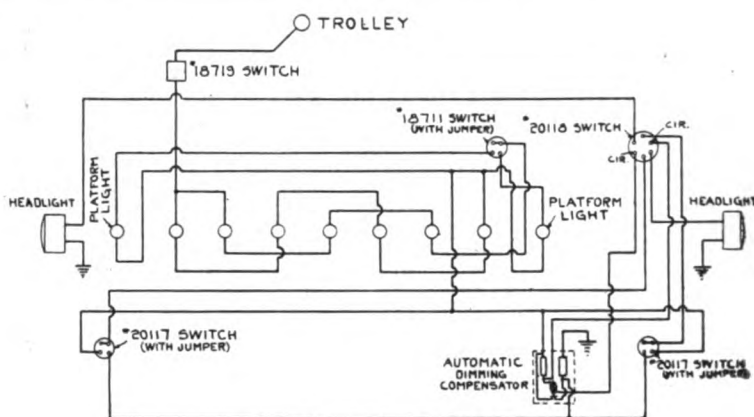
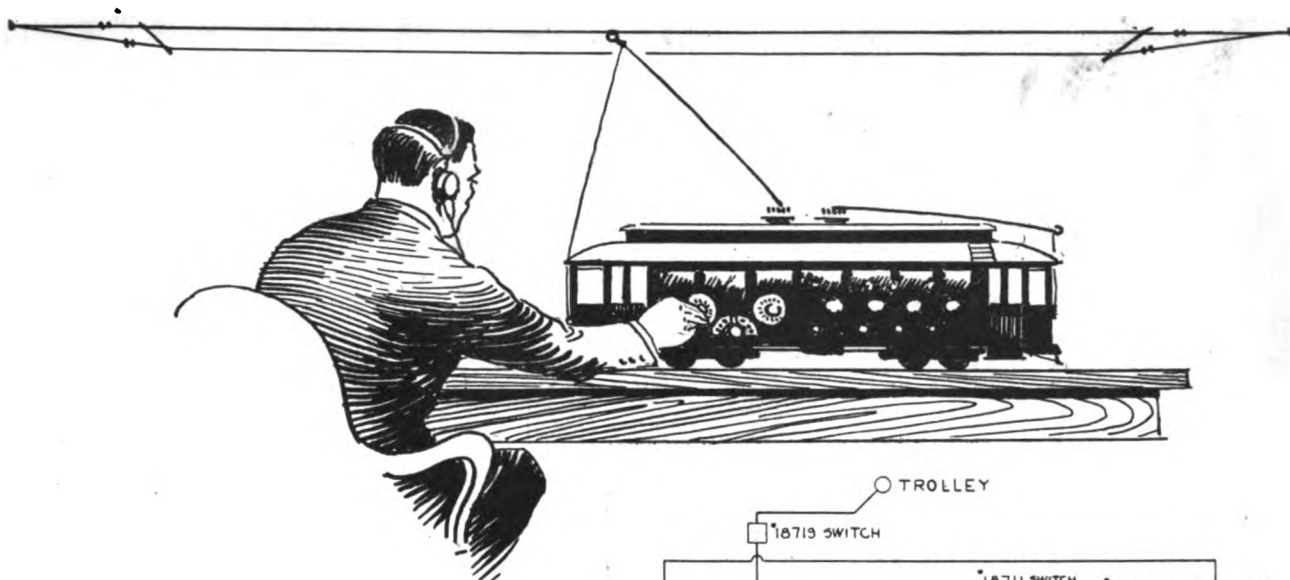
To be Complete—Safe, a signaling system must be based upon the sound principles of the Continuous Track Circuit, or in other words, a means must be provided whereby each car or train is responsible by its mere presence *anywhere* in the block or spacing section to *continuously* maintain one or more opposing stop signals in front of it as well as a stop signal behind it.

Local conditions govern each installation. Let one of our Engineers show you the benefits which Signals will produce for your Railway.

Union Switch & Signal Co.

SWISSVALE, PA.





Try this Hook-up

List of Keystone Specialties required per car

- 2—Golden Glow headlights
- 1—Automatic compensator dimmer
- 4—Compensator lighting fixture
- 2—"Bright" and "Dim" switches
- 1—DP, DT switches

Diagram shows wiring connections for double end car with two headlights, either headlight operating in series with one-circuit of interior car lights, equipped with compensating fixtures including switches for operating opposite headlight and using type USA automatic compensating-dimming resistance.

This makes a single, fully compensated circuit which provides interior car lighting and headlight and permits the dimming of headlight without affecting car light.



ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
829 Oliver Building

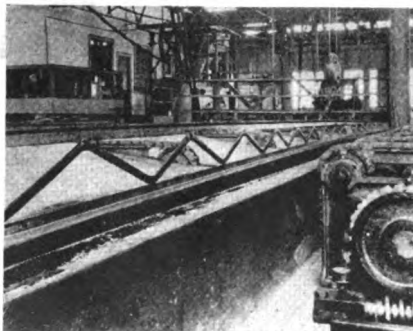
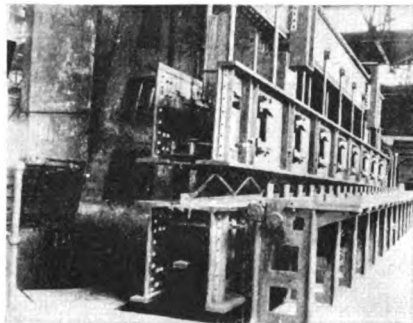
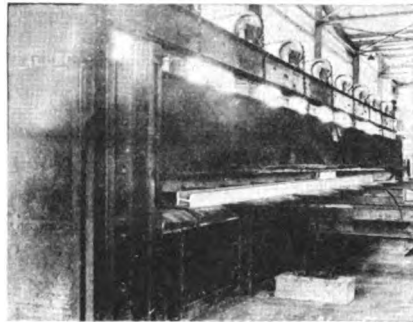
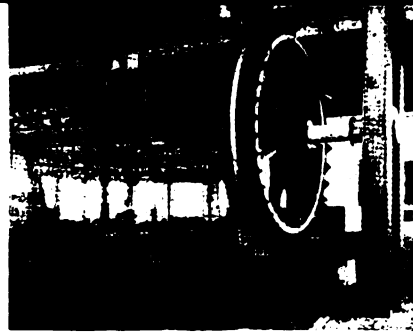
Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

NEW YORK
50 Church St.

SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.

BOSTON
88 Broad St.



B E S T
Bates Expanded Steel Truss Co.
Illinois Merchants Bank Bldg.
Chicago, Ill., U. S. A.

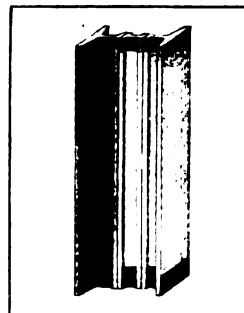
Sheared, Heated, Expanded— Shipped!

Special rolled Bates "H" sections are sheared (cold) by an enormous rotary shear and charged directly into an oil combustion furnace, and the sheared and heated beams are drawn endwise from the furnace and automatically charged into the expander. The expander grips the flanges and expands the beams. The act of expanding the beams elongates the web portion between the points of unsheared intact, creating, without waste of material, perfect Bates One-Piece Poles.

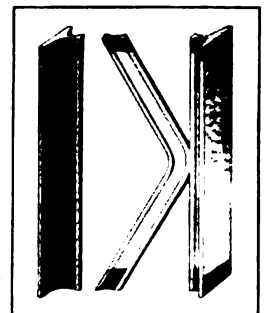
The expanded poles are drawn from the expander onto moving chains, sent through a mechanical straightener, cleaned, and painted. The paint is thoroughly dry by the time the pole has become cool and the finished pole is ready for shipment.

Rapid production makes Bates Poles economical in first-cost — their simplicity makes them easy to maintain.

Before Expanded



After Expanded



BATES ONE PIECE POLES
EXPANDED
STEEL



A Mark of Merit!

N.P.—“National Pneumatic” stands for years of experience, a solidly established enterprise, a line of reliable, durable, proved equipment.

N.P.—“National Pneumatic” Equipment includes door engines, door and step control, operating mechanisms, and motormen’s signal lights. All time-savers, all safety increasers, all efficiency makers—in short they are all producers.

National Pneumatic Co., Inc.

Originators and Manufacturers

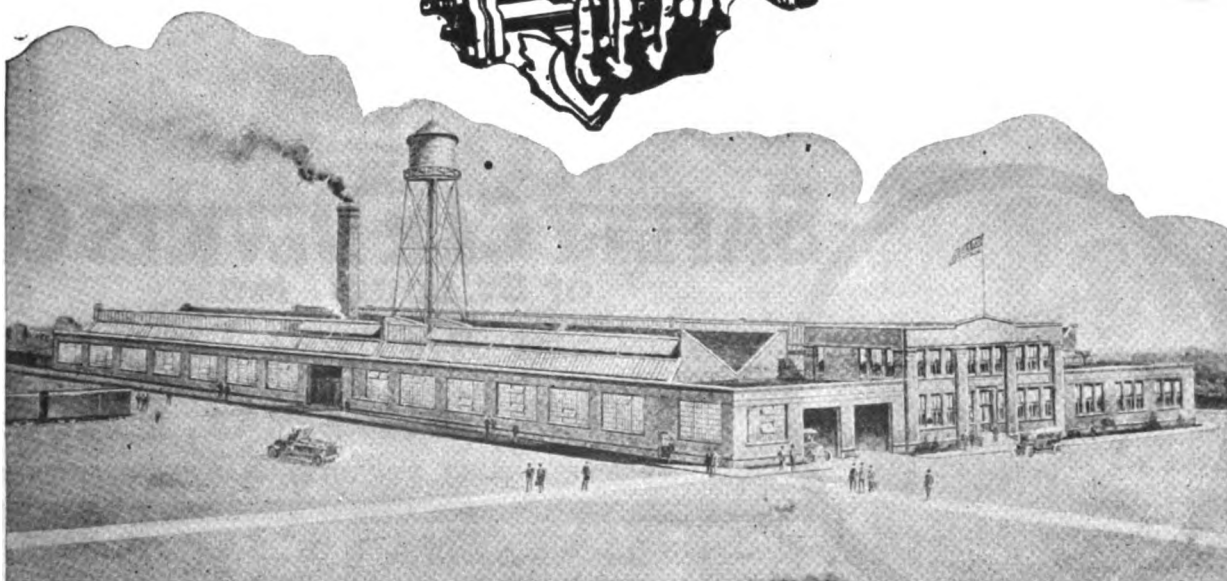
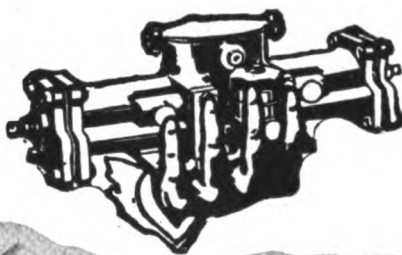
Principal Office: 50 Church Street, New York

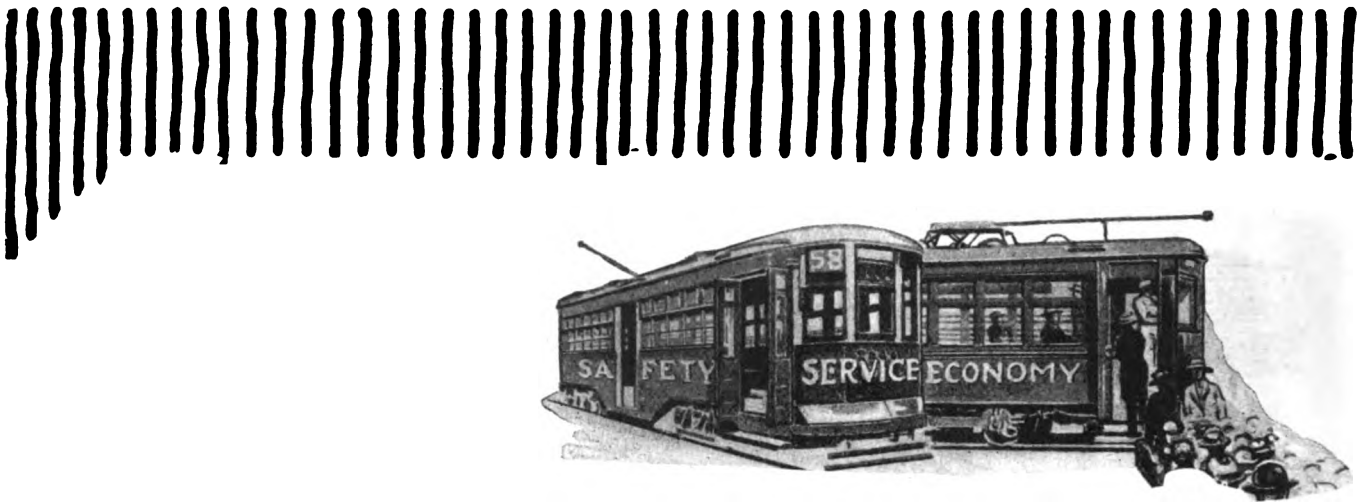
Philadelphia—Colonial Trust Building

Chicago—McCormick Building

Works—Rahway, New Jersey

Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.





2000 NEW SAFETY CARS in 1923

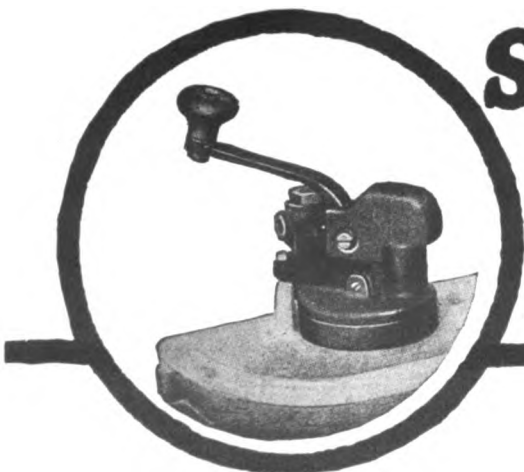
**“Earn More
by
Saving More”**

DURING 1923 we furnished Safety Car Control Equipment for 2000 new Safety Cars.

Over 1600 of the cars thus equipped for one-man, or one-man, two-man service, were newly built during the year. The balance were old two-man cars converted so as to give the owners and the public the advantage of safer and more economical operation.

These figures will dispose of any doubt which may remain as to the preferred position of the Safety Car in traction circles.

Our Air Brake and Safety Car Control Equipment makes any car a Safety Car.



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH



Another Need for Power Brakes is Filled

THE introduction of trackless trolley transportation has been accompanied by a new need for power brakes.

With customary foresight, we have developed a special type of Air Brake equipment to meet this need and its adaptation will be found to add greatly to the safety and all-around practicability of trackless trolley service.

The equipment is light and simple in design, but rugged, and provides all the essential features of the standard Westinghouse Traction Brake.

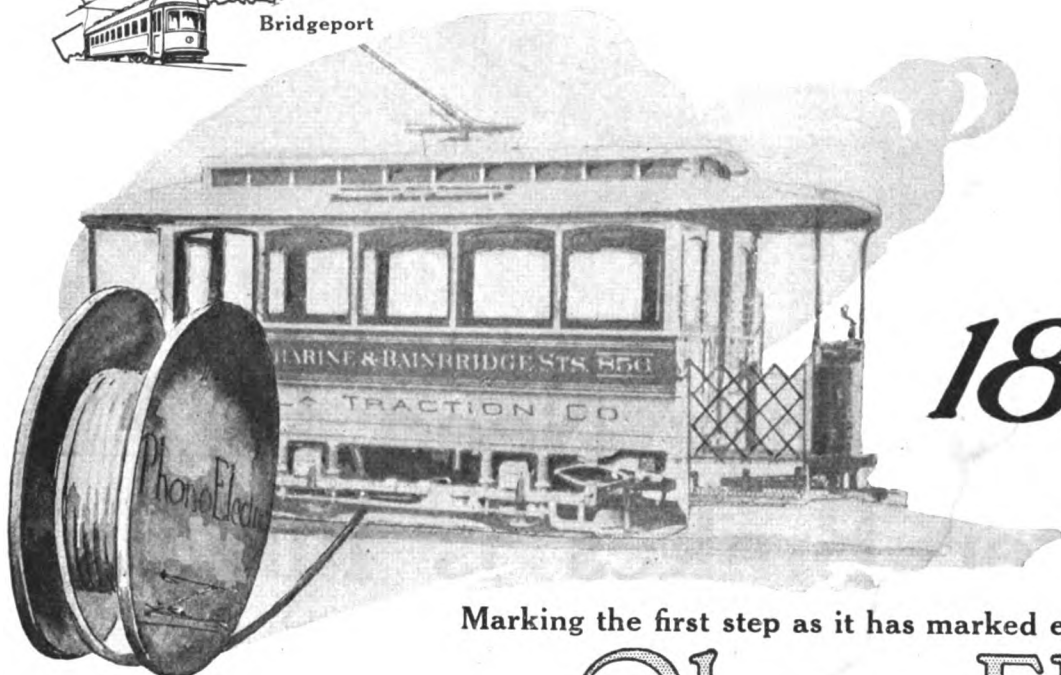
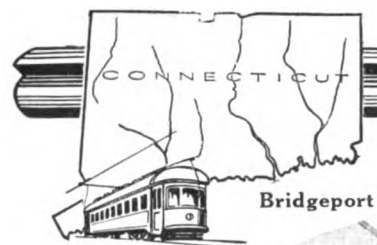
Its advantages will be readily appreciated by trackless trolley operators, who sense the need for unlimited, flexible braking force which can be applied instantly and smoothly, without exertion.

Westinghouse Traction Brake Co.
General Office and Works: Wilmerding, Pa.



WESTINGHOUSE TRACTION BRAKES

A helpful service to the electric railway industry is located at Bridgeport



1892

Marking the first step as it has marked each succeeding step

Phono-Electric in Philadelphia

Looking back thirty-one years to the days of the first electric cars in Philadelphia presents, at once, a history of successful street railway operation, and an unbroken record of Phono-Electric development to meet each new need.

The first foot of wire strung on Catherine and Bainbridge Streets in 1892 was made by this company. It lasted twenty-one years in continuous service, under a headway, which, from 10 minutes at first, was increased year by year to meet traffic demands.

And now the giant new cars of the P. R. T. rumble through Philadelphia's streets on an average headway of 10 seconds at peak hours and 30 seconds at non-peak hours. More than 285 miles of all the overhead is Phono-Electric—the only trolley wire which has proved equal to the strain, on curves and heavy traffic sections.

NEW YORK
PHILADELPHIA
CHICAGO
DETROIT

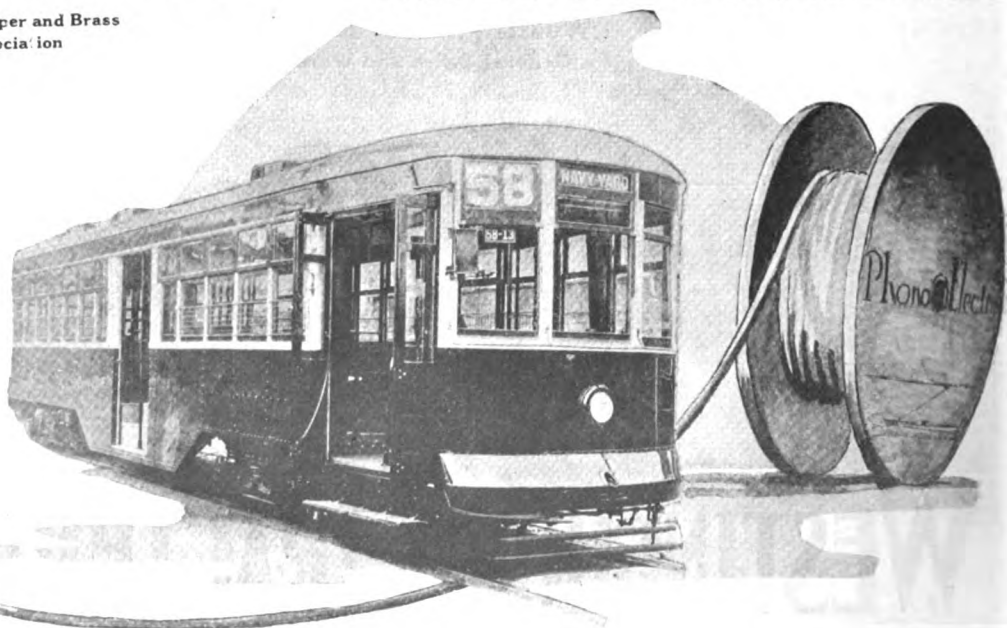
Bridgeport
Brass Company
BRIDGEPORT - CONNECTICUT

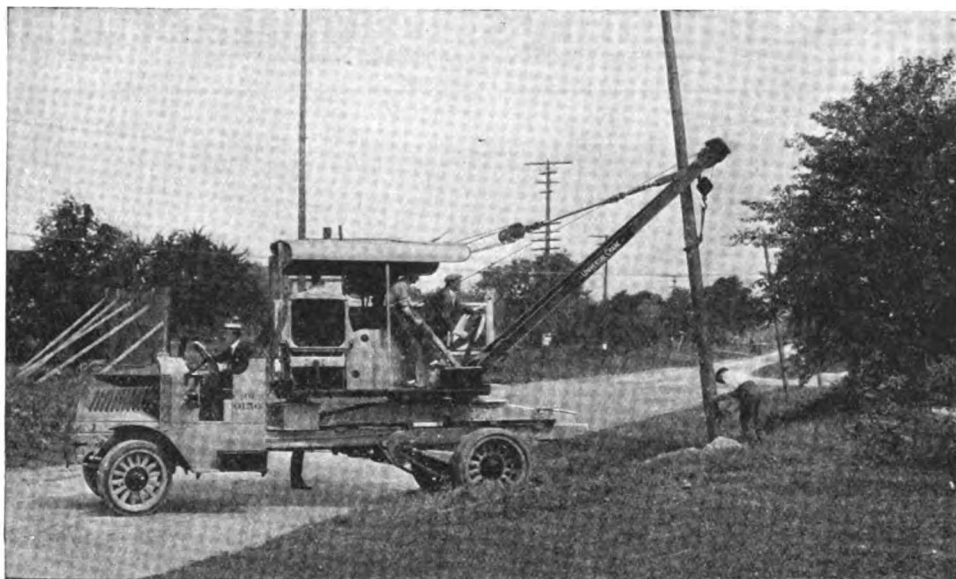


Electric
Furnace
Products

Members Copper and Brass
Research Association

1924





Setting the Pace in Setting Poles!

This Universal Crane, mounted on a Mack truck, can set poles faster than three gangs of men using hand methods.

When equipped with a clam-shell bucket, it effects similar economies over manual operations in unloading bulk material from freight car to pile or from car to truck.

Street railways are using "Universals" for laying and handling track work at intersections,

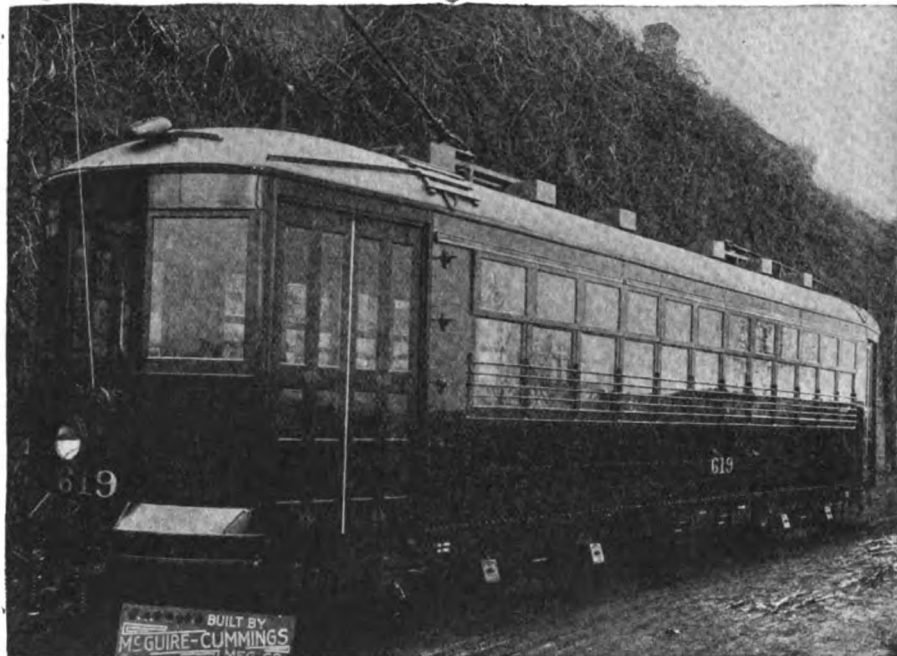
loading excavated material on track replacements or extensions, placing poles, handling ballast in yards, and for replacing large gangs of men by handling all heavy lifts in the field.

The Universal is the preferred type of mobile crane for many definite reasons, fully explained in our literature. For one thing, the Universal is *full revolving* and requires *no outriggers*. Reliability is its chief asset. Adapted to every type of mounting. Write for Bulletin G22.

The UNIVERSAL CRANE CO.
1191 Swetland Bldg. Cleveland, Ohio
Branch Offices in Principal Cities



McGuire-Cummings Manufacturing Co.



*Multiple-unit-control double-truck passenger car for two-man operation—
Built for Georgia Ry. & Power Co., Atlanta.*

The above shows type of cars built for the Georgia Railway & Power Co. of Atlanta. Succeeding advertisements will feature cars of the following types recently built by us.

- | | |
|--|---|
| <p>1. Light-weight, Double-truck Cars
One-man-two-man operation. Built for Des Moines City Railway Co., Des Moines, Iowa.</p> | <p>3. Center Entrance Cars
(Peter Witt type.)
Built for the City of Detroit.</p> |
| <p>2. Safety Cars for One-man Operation
With double doors. Built for Gary Street Railway Co., Gary, Ind.</p> | <p>4. Light-weight Suburban Cars
Built for Chicago & West Towns Railway Co.</p> |

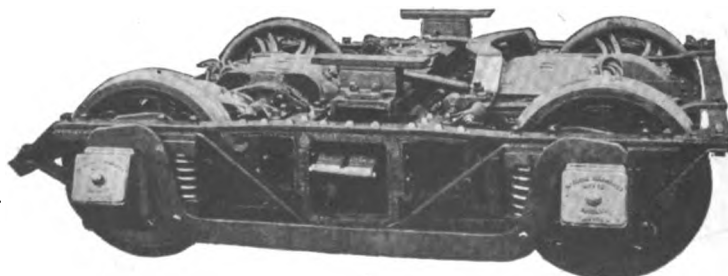
Our engineering department is at your service. We will be pleased to either submit specifications and drawings and to quote prices thereon, or we will submit proposals on specifications furnished.

McGuire-Cummings Manufacturing Co.

General Offices

111 W. Monroe St., CHICAGO, Ill.

**McGuire-Cummings
No. 62 motor truck
for low car body
for city service**



**Inside hung
brake equalizer
design, 26-inch
wheels**



Lubricants that deliver dependable service

Galena Electric Car Oil
Galena Power House Engine Oil
Galena Power House Valve Oil
Galena Turbine Oils
Galena Dynamo Oils
Galena Air Compressor Oils
Galena Track Oil
Galena Gas Engine Oil
Galena Commutator Oil
Galena Electric Generator Oil
Galena Anti-Friction Triple Valve Oil
Galena Air Brake Compound
Galena Gear Greases
Galena Ball Bearing Grease
Galena Roller Bearing Grease
Galena Motor Grease
Galena Trolley Grease
Galena Solidified Oil
Galena Lubricating Grease
Galena Sponge Grease

Perfection Signal, Galena Railway Safety and Galena
Long Time Burner—burning oils unequalled for safety
and reliability.



Galena-Signal Oil Company

New York

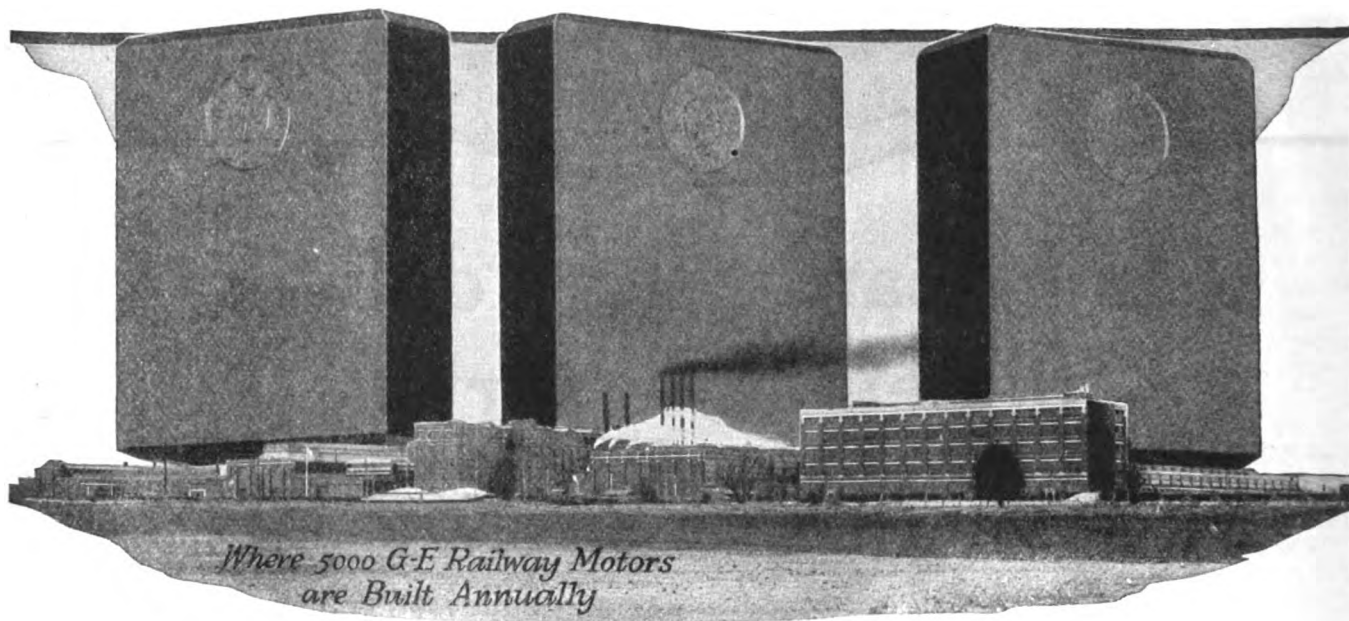
Franklin, Pa.

Chicago

and offices in principal cities



*You get best results from brushes built and applied
with a full knowledge of the motor itself*



The Logical Foundation

Brushes are only one of the elements affecting commutation. Their correct selection and proper application depend on an understanding of the motor design, its characteristics and its limitations. G-E Carbon Brushes are founded upon the knowledge and experience gained in observing the operation of millions of motors, thousands built for railway service every year.

These brushes have contributed to the success of G-E Railway Motors. The operation of the motors can be guaranteed only so long as the quality of their component parts is maintained.

G-E Brushes are made in grades suitable for all your requirements. And if you have any difficult commutation problems, G-E brush specialists are at your service.



General Electric Company
Schenectady, N. Y.



40-243

GENERAL ELECTRIC

New York, February 2, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, Editors

Volume 63
Number 5

Which Bus Companies Should Have Membership in the A.E.R.A.?

THIS paper has advocated the admission of bus operating companies to membership in the American Electric Railway Association, but with certain very definite restrictions as to qualifications for membership. In view of the fact that this matter is again under consideration by the executive committee of the American Association and that some opposition is being expressed which it is believed would be answered by these restrictions, it may be well to repeat them.

The JOURNAL believes, as was expressed in these columns in the issue of Nov. 3, 1923, page 766, that such membership should be limited to those bus companies which are *well established, permanent, dependable, legally authorized carriers operating non-competitively*. Inasmuch as each application must be passed on and approved by the membership committee and the executive committee, any member company would have ample opportunity to voice its objections if any local bus company did not, in the opinion of the railway, measure up to the qualifications for membership. It is believed that these limitations meet most of the objections that are raised to admitting bus companies.

The manner of handling memberships might be to provide a new class of membership known as bus members. Such membership would include the privilege of engaging in the activities of the American and affiliated associations, namely, the Engineering, Accountants', Claims and the Transportation and Traffic Associations, which are the fundamental divisions into which the transportation business naturally falls. The association now has railway members, manufacturer members, individual members, etc., and the privileges of each are prescribed, there being some limitations on the memberships other than railway. So a new "bus member" classification would not be inconsistent.

Or, there might be formed the American Bus Association, affiliated with the A.E.R.A. and having its own standing committees on accounting, claims, engineering and transportation and traffic. This suggested affiliation identifies the bus in its proper relation to the railway, which is the main transportation agency in most communities and territories. However, we may look ahead to the time, not many years hence if the American Electric Railway Association grasps the opportunity now open to it, when it will dominate all local and inter-urban transportation, and become in name as well as in fact the American Transportation Association.

But some raise the question: Why take in bus companies at all? Several reasons were set forth in the editorial previously referred to. Two other reasons should be mentioned here. The first is that if the railways are to take hold of the bus and maintain the principle of monopoly, which should prevail, they need all the knowledge and experience they can get with respect to bus operation, and bus companies can contribute

something in this respect as well as gain much from the counsels of the railways. Their presence in railway counsels will also tend to temper a tendency to bring about unnecessarily severe regulation and taxation of the bus that will later come back upon the railway. There is furthermore the wider community of interest in which bus and railway might to mutual advantage join forces.

The second reason is that it is only a matter of time until there will be a strong national association of bus operating companies. Attempts in that direction have already been made, though the result is rather feeble to date. It seems obvious that it would be better from the railway standpoint to have such an organization affiliated with or a part of the railway association than to have it conducted as an independent and probably more or less antagonistic association. And certainly it would be to the advantage of the bus companies to be affiliated with a strong, going transportation association such as the A.E.R.A.

Transportation Development Should Not Be Limited by State Boundaries

ANOTHER instance of the tendency to consider matters of benefit to the public at large from the political angle is seen in the objections that have been raised to the proposal to extend the New York City subways across the Hudson River into New Jersey. This project, as explained in a recent issue of this paper, would make possible more intensive use of the existing subways in Manhattan Borough, and thus increase the net earnings that could be obtained from the rapid transit investment of the city of New York. It would relieve congestion on the streets of Manhattan, and also permit the elimination of many ferryboats now using valuable harbor space on the North River and congesting navigation. Furthermore, it would not affect adversely the finances of the subways, since the proposed plan provides that the construction cost would be borne by New Jersey interests, and the additional operating costs would be charged against the new riders in the form of additional fares.

With the existing great need for residential areas in the vicinity of Manhattan Island, it is clear that the demand cannot be satisfied by the space available for housing accommodations in the five boroughs of the city. The real objection is summed up in one sentence in an editorial in a New York financial paper:

"The result would needs be to enhance the convenience of those people who earn their money in New York, but spend it in New Jersey and pay taxes there." Of course, the answer to that is that the residents of New Jersey who commute to New York are going to do so anyway. And also, while a Jerseyman may spend a

large part of his earnings outside of New York, his work in New York creates more wealth for this State than he takes out of it.

Local prejudices of this nature obviously should not be allowed to prevent the expansion of local transportation along the lines that will represent the greatest service to the people as a whole and also result in lowering the burden to the citizens of New York City. There is no good reason why communication across the North River should not have been developed in a manner similar to that across the East River. Since the North River is a State boundary line, it has been an artificial barrier which has been permitted to stand in the way of the development of a most convenient and much needed residential area close to New York. Thus there are sixteen street railway and rapid transit tracks over bridges and ten through tubes connecting Manhattan to Long Island, but no bridges and only four such tracks in tubes to New Jersey. These four tube lines to New Jersey were built by private interests, while nearly all the tubes and bridges over the East River were public works.

The Claim Agent Naturally the One to Direct the Safety Movement

TO SOME the immediate direction of the safety campaign on an electric railway system by the claims department seems somewhat inappropriate. Accident prevention, they argue, is largely in the hands of the trainmen, and the superintendent of transportation is much closer to them than is the claim agent. It is the transportation department which trains the men, issues the rules under which they work, and disciplines them in case the rule is not followed. Moreover, the transportation superintendent is closer than the claim agent to the public; he has to study their habits as regards transportation, and he has opportunity through his inspectors and supervisors to know how best to avoid accidents. On the other hand, the work of the claim agent is largely of a legal nature. Let him attend to the settlement of accidents after they occur, but put the direct responsibility for accident reduction on the superintendent of transportation.

This, however, is a partial view of the situation. Undoubtedly, in any safety campaign, active sympathy and hearty co-operation on the part of the superintendent are required, just as they are necessary from all connected with the company, from the president down. But, unless there is a special official, such as a safety engineer, to carry the responsibility of the safety movement, the claim agent is logically the one to do it. Even on the large road, where the engagement of a special safety engineer is warranted, he should work in very close accord with the claim agent.

There are many reasons which point to the claim agent as the one whose duties logically direct his attention to the need of safety and whose experience is invaluable in promoting any safety movement. In the first place, his main duty, broadly speaking, has always been to reduce by every legitimate means the amount of money which the company has to pay out for accident claims, and a common measure of his efficiency is the percentage which the amount so paid out bears to the gross receipts of the company. It is obvious, therefore, that if he can reduce this percentage by preventing accidents, he is working at least as effectively as if he was making the same reduction in court awards—and, of course, actually the work is more effective.

Again, from his study of accident cases, the claim agent is in a peculiarly advantageous position to know the causes of accidents, particularly the causes of accidents for which the law holds an operating company responsible. He knows, for instance, perhaps better than any one else on the property, the time and distance required at different speeds to stop a car under various conditions of rail, the precautions which the conductor or a one-man car operator should take to see that the passenger has safely boarded or left the car before the start is made, and those which should be taken at grade crossings with steam railroads or on his own line, and the time and place at which the warning whistles should be given and the length in seconds of the blast, before the grade crossing is reached.

The consequence of this specialized knowledge is that the claim agent can often see dangerous practices which would not be apparent to the superintendent of transportation. It is natural that this should be so because his mind is constantly on ways and means to reduce accident claims, and his thoughts in this respect are quickened by a recollection of testimony in the court relating to the neglect of precautions, which might have prevented an accident. Of course, it is the aim also of the superintendent of transportation to reduce accidents, as part of his main duty of increasing the transportation receipts and decreasing the transportation expenses, but of these objects, the reduction of accidents, although an important factor, is but one of many.

Luxury Travel May Pay Now Where It Formerly Failed

IN TIMES long past, some electric railway men have tried certain kinds of luxury travel accommodations such as club, parlor and dining cars, which were not then patronized to a sufficient extent to make them profitable. They rather naturally use this as a precedent for not undertaking anything of the sort today. But there is plenty of evidence that times have changed.

People are spending dollars freely now where in pre-war times they were unwilling to part with an extra dime. They may "crab" about an 8-cent street car fare (or their politicians may) but they are perfectly willing to pay the extra price for a parlor car seat or space in a Pullman when traveling even comparatively short distances.

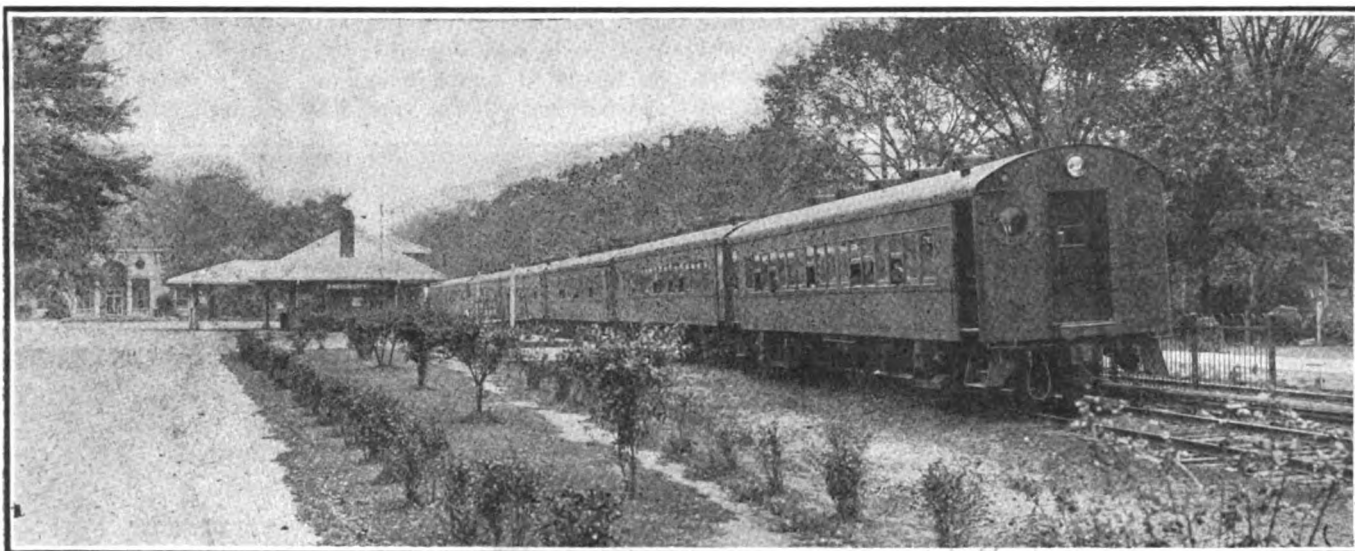
Both the Chicago-Milwaukee and the Indianapolis-Louisville electric lines, which have installed extra-fare parlor or club car service during the past year, have found that the better comfort was well patronized almost from the very start. Both these lines have neighbors which tried something that approximated the same service in pre-war times but was abandoned for lack of patronage. It merely goes to show again that people nowadays demand (and are willing to pay for) something better in transportation than just the ride between two points. They want to make their journey faster and in greater comfort than was formerly expected.

Of course, the main advantage in such luxury service is not in the profit from the chair-car charge or from the meal served en route, which is small if any, but in the fact that it attracts additional passengers to the railway. It is believed that many interurban railways which connect good terminal cities two hours or more apart may now well consider the installation of these various means of providing additional comforts in travel.

Make it easier to travel and more will travel.

Features of New Long Island Cars

Framing Is Designed to Resist Collapse in Collision and Facilitate Repairs When Damaged — Clasp Brakes and Other Improvements in Trucks and Air Brake Equipment Assist in Operation of Long Trains — Two Motors per Car Are Arranged for Tap Field Control



Train of New Multiple-Unit Motor Cars on the Long Island Railroad

SIXTY additional motor cars, pictured herewith, have recently been ordered by the Long Island Railroad for its electrified train service out of New York City. These are being built by the American Car & Foundry Company. With other cars of the same type ordered in 1923 there will be a total of 140 cars of this new type in service.

The new cars follow steam railroad practice closely. They are 64 ft. 5½ in. long and seat seventy-eight passengers. The weight, fully equipped, is 57½ tons, or 1,474 lb. per seat. The accompanying table gives the principal data.

The construction of these cars follows closely the design of the Class T-54 trail cars used by this company, with such modifications as are necessary to adapt them for motors and control.

GENERAL DATA OF LONG ISLAND CARS

Length over buffers	64 ft. 5½ in.
Width over all	9 ft. 10¼ in.
Seating capacity	78
Weight	115,000 lb.
Diameter wheels	36 in.
Maximum speed	54½ m.p.h.

A box girder made up of two 9-in. channels spaced 16½ in., back to back, with a top and bottom plate, form the center sill or stress member. The top cover plate extends the entire length of the channels. The platforms are made of diamond pressed plate. The bottom cover plate extends the entire length of the channels between the platform and end casting. An additional bottom cover plate is used on each end of the car as a reinforcement and this extends from the front end of the draft gear past the center casting to about 2 ft. beyond the cantilevers.

Each end of this box guide is framed in a large steel casting which forms the end of the car. This casting is designed with recesses to accommodate the

spring buffer. There are also framed in at this point two 12-in. I-beams which form the diaphragm posts and extend to the roof. The roof purlins are riveted to the tops of these. This center sill takes all bumping strains and prevents buckling of the car, while the large 12-in. I-beams prevent telescoping.

The end construction of the cars is of flat sheet steel. This type of construction was adopted due to the ease with which repairs can be made after damage. Experience of the railway indicates that the ends of steel cars are the parts most frequently damaged. With flat plate construction, repairs can be made very quickly and it is not necessary to wait for specially curved or shaped sections ordered from the car manufacturers nor to keep on hand a large stock of special replacement parts.

The cars have single outside sheets, lined with three-ply Salamander, with inside finishing sheets. The roofs are of the arch type and are constructed of single sheets, lined with three-ply Salamander, with an inside finish sheet.

The trucks are a one-piece cast steel type, manufactured by the Commonwealth Steel Company, St. Louis, Mo. This is an equalizer type. All wearing surfaces are provided with detachable wearing plates. All parts are very liberally designed in order to reduce maintenance repairs. The trucks are provided with clasp brakes and the brake rigging is very substantially constructed. A particular feature is the method of taking up slack. Instead of the usual screw and nut or turnbuckle arrangement, a split collar clamps over two rods. The rods have a succession of rings, and the inside of the split clamp has projections which fit between these. Slack is taken up by loosening the clamping nuts of the collar and sliding this along to a new position on the rod. The slack is automatically taken up by an air slack adjuster, and with the type of con-

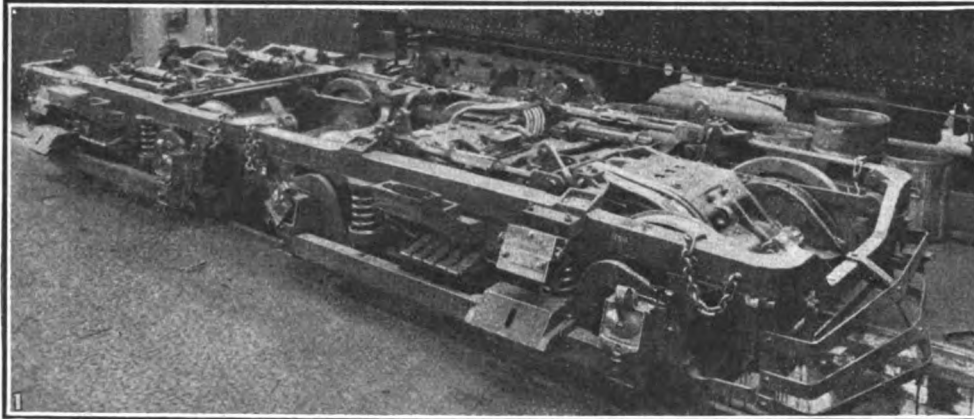
struction used it is found possible to wear out a set of brake shoes without hand adjustment.

Some improvements have been made in the air brake equipment over that used on older type cars. The Long Island Railroad operates many ten-car trains in its electrified service, and the time at terminals for making up and getting these trains into service is quite limited during rush hours. Difficulty was experienced in some cases where cars were coupled to others with low reservoir pressure. The coupling to these cars usually caused the brakes to go into emergency, and considerable time was taken for the compressors to pump up sufficiently to allow the brakes to release.

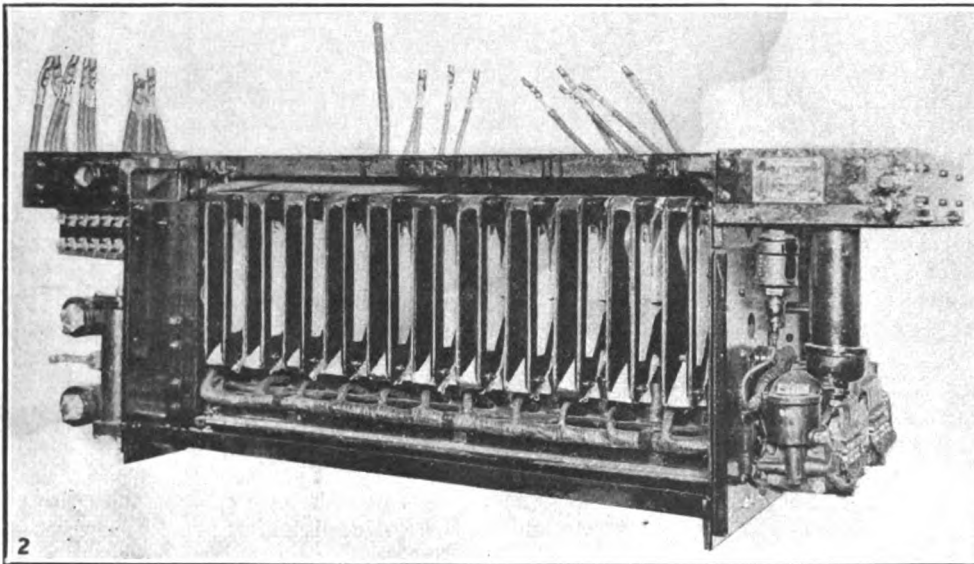
equipment includes the U-12 Universal valve, M 19 C brake valve, and D 3 F compressor of 35-ft. capacity.

The lighting of the cars is from twenty-five lamps, each of 23 watts capacity. These are arranged in two rows on either side of the aisle. The lamp sockets are mounted on the purlins and the lighting wires run inside these.

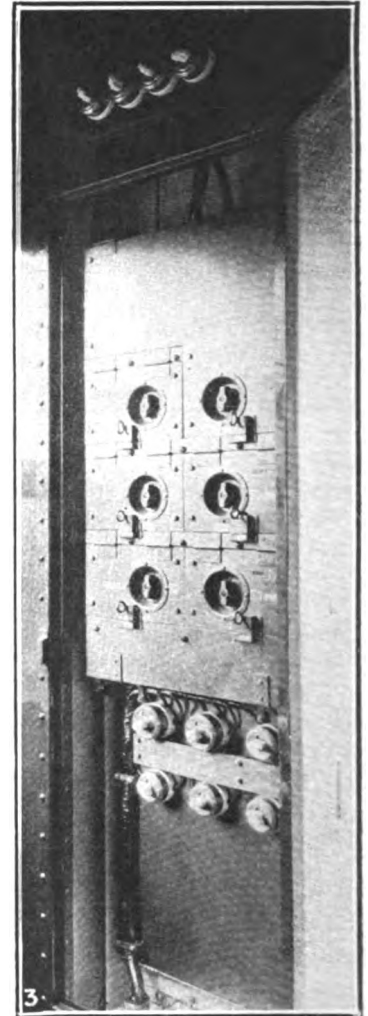
A new feature of the auxiliary equipment is the provision of a safety switchboard for the light, heater and compressor circuits. In this construction the switch controlling each individual circuit is inclosed in an insulated compartment, so that a short circuit in one portion will not spread to adjacent circuits. Pro-



No. 1. The Trucks Are of the One-Piece Cast Steel Type, with Clasp Brakes and Detachable Wearing Plates



No. 2. New Type Switch Group Used on Long Island Cars with Covers Removed



No. 3. The Compartments of This Safety Switchboard Panel Cannot Be Opened with the Circuits Energized

It was also found desirable to shorten the time of release of brakes after an ordinary emergency application.

The main reservoir line was increased from $\frac{3}{4}$ in. to 1 in. and the branch pipe to the motorman's brake valve was also increased to 1 in. A new feed valve was designed for this service, which is much larger, has larger ports and a larger piston. The air pressure which acts on the diaphragm is brake pipe pressure from the motorman's brake valve. Through the improvements made in piping and air brake equipment the time of releasing brakes after an emergency application was reduced greatly.

The air brake equipment is Westinghouse type AMU. In addition to the changes just described, the

vision is also made so that the covers of the switch compartment cannot be opened until the switches are in their "off" position. This is accomplished by a slot in the pocket surrounding the operating handle. To open the box, the handle must pass through this slot, and this can only take place with the switch in the off-position. This type of switch construction also permits of an improved arrangement of switchboard connections. These are all of flat copper strips and the main feeder and load side of the switches are in inclosed compartments.

The motor equipment for each car consists of two Westinghouse type 308-G-1 motors of the standard box frame type. The main field windings of the motor are arranged for tap field connections on the last run-

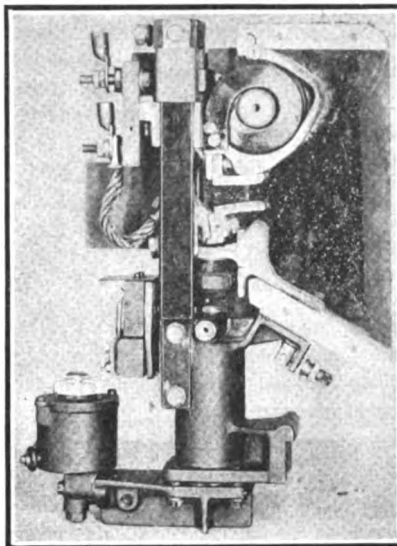
ning point. The housings and gear cases are especially designed to permit the use of clasp brakes. These motors are very similar to the Westinghouse type 308 motors, which have been previously used by the Long Island Railroad on all its motor cars.

The control equipment is Westinghouse type ABF, arranged for automatic acceleration and field control of the motors. This control will operate with all existing equipment of the company. Electro-pneumatic switches are used and energy for operating the control apparatus is furnished by 14-volt storage batteries, two of which are provided per car, so as to be charged and used on alternate days.

The main motor control consists essentially of thirteen unit switches of the HL electro-pneumatic type. Automatic acceleration is accomplished by the use of the usual current limit relay, which regulates the movement of a sequence drum, which in turn energizes the magnet coils of the electro-pneumatic unit switches in the required sequence.

The main control circuits are arranged with a total of twelve steps. Seven of these are for series operation and five for parallel operation. Bridging method of transition is used between series and parallel. The normal or tapped field connection for the motors is effective only on the last full parallel running point. In addition to the control group, a line switch or circuit breaker is used which has parts interchangeable with those in the switch group. The use of two overload relays to operate the line switch, one connected in each leg of the motor circuit, provides for more sensitive operation than the usual type of single overload trips, since each is set at approximately one-half the current value required for a single relay. Either or both of the relays can be reset by a single reset coil, which is energized from a plug switch located in the master controller.

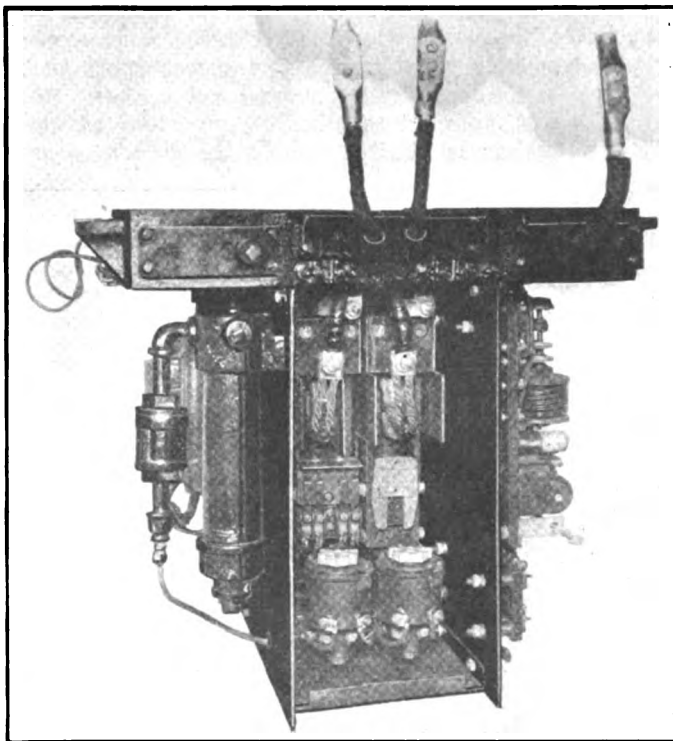
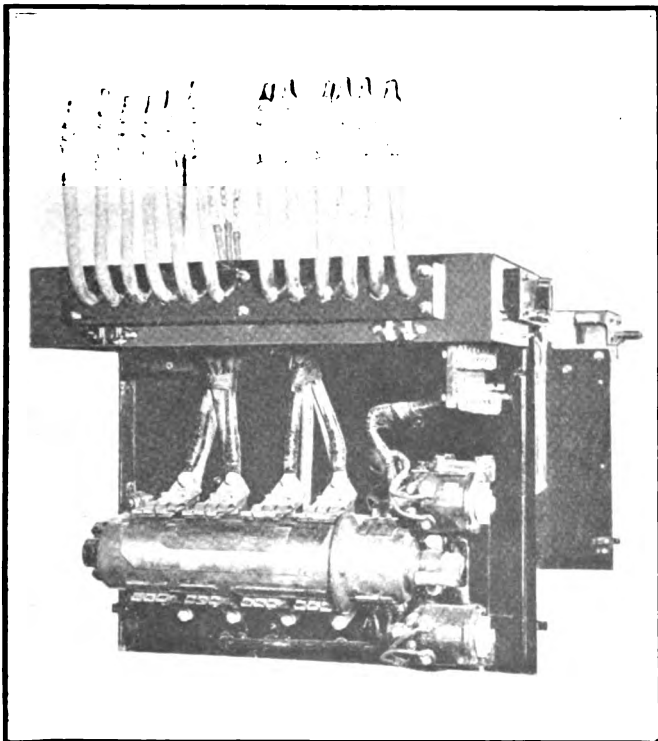
The main control is mounted in a skeleton frame completely inclosed by removable covers. On one end of the group is the sequence switch and limit relay,



Unit Switch with One Side of Arc Chute Removed to Show Construction

while the other end contains an electro-pneumatically operated drum type reverser. The sequence switch, which energizes the magnet coils of the controller in the proper order, consists of a drum which is operated by air cylinders through a rack and spur gear with teeth cut at an angle of 45 deg. Entrance of air into the operating cylinders is controlled by two magnet valves, one for "on" and the other for "off" motion.

The operation is on the balanced air principle. If both "on" and "off" magnets are energized at the same time, movement of the drum takes place, since the air pressure on the piston is unbalanced by air being admitted through the "on" valve and released through the "off" valve. Movement is stopped by de-energizing the "off" magnet, which will then admit air and cause the pressure on the piston to become balanced. To move the drum in successive steps, it is only necessary to energize the "on" magnet from the supply circuit and the "off" magnet through the limit relay contact. When both magnets are de-energized, as when the master controller is in the "off" position, the air in the "on" magnet cylinder is exhausted to atmospheric pressure, while that in the "off" magnet valve is at reservoir pressure, thus moving the drum to the "off" position and holding it there.



At Left, the Drum-Type Reverser Is Mounted on One End of the Switch Group. At Right, Type of Line Switch Used on New Cars

The control circuits of the magnet coils are so interlocked that rotation of the drum is permitted unless the line switch is closed, and as the line switch when once opened cannot be closed until the drum returns to the first operating position, independent operation of either is eliminated.

Bargain Sale of Passes Proves Profitable

Reduced Rates on the Lines of the Beaver Valley Traction Company During August, 1923, Produced Higher Revenue than Normal Rates During the Same Month in 1922

FOR five weeks beginning Aug. 6, 1923, the Beaver Valley Traction Company, New Brighton, Pa., sold the all-zone pass, normally costing \$2, for \$1.50. At the same time the price of the two-zone pass, normally \$1.60, was reduced to \$1.50. The purpose of this bargain sale of passes was to stimulate passenger traffic, which is ordinarily at a low ebb during that season. That considerable success attended this effort of the company is shown by the fact that the gross revenue for August, 1923, was approximately 15 per cent greater than for August of the year before.

A somewhat similar experiment had been made by the Beaver Valley Traction Company during the previous spring. At that time free tickets were given as a bonus to those who bought the weekly pass. With an 85-cent pass two free tickets were given, with a \$1.60 pass three free tickets, and with a \$2 pass five free tickets. During the weeks from May 4 to May 25 this scheme was in effect. Financially the result was inconsequential. That is to say, the gross revenue remained about the same. The extra riding on the free tickets was apparently about balanced by the extra riding for cash. As a whole, however, the pass-buying public was pleased to get this appreciation of its patronage and the company profited on the score of public relations if not in the matter of revenue.

Probably the reason why the free ticket scheme was not more popular was that the saving was contingent upon the buyer of the pass having a companion. His own pass was sufficient to take him anywhere at any time, and unless he desired to pay the fare of some

	Four Weeks July 9 to Aug. 5	Four Weeks Aug. 6 to Sept. 2	Four Weeks Sept 10 to Oct. 7
\$0. 85 passes.....	1,153	985	1,096
\$1. 60 passes.....	412	.....	385
Universal passes.....	1,805	3,414	1,889
Total passes.....	3,370	4,399	3,370
Adult passenger revenue..	\$5,248	\$5,944	\$5,423

other person he would have no use for the free tickets. It was thought, therefore, that a more favorable reaction would be obtained if a method were devised to give a direct saving to the buyer of the pass. To this end the reduced rate sale of passes during August was tried with price reductions as stated at the beginning of this article.

A comparison of the three periods of four weeks each, that preceding the bargain sale, that during the bargain sale, and the one immediately thereafter, shows that the revenue was considerably greater during the bargain sale.

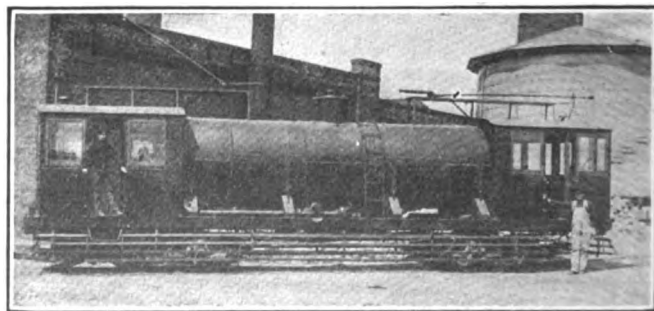
It is seen from the figures in the accompanying table

that the number of one-zone passholders was materially reduced during the period of the bargain sale, and even after its ending the number did not increase to its former size. The number of two-zone pass holders was of course reduced to nothing, because the price was made the same as that for the universal pass. A great increase occurred in the number of people buying the universal pass, and to some extent this increase appears to have been retained after the passes returned to their normal price. It was noticeable also that although August is usually the poorest month of the year the total number of pass buyers and the gross revenue were higher during the four weeks from Aug. 6 to Sept. 2 than during the four weeks just before or after.

The beneficial effect on the income of the Beaver Valley Traction Company and the Pittsburgh & Beaver Street Railway, operated by the former company, can be seen from the fact that in July, 1922, the gross revenue was \$53,707, and in July, 1923, \$57,815, or an increase of 9½ per cent. In August, 1922, the gross revenue was \$48,448, while in August, 1923, it was \$55,490, or an increase of 14½ per cent over the preceding year. Thus August, 1923, almost equaled July in revenue, whereas the year before August was considerably lower than July, showing the value of the pass sale. It may be noted that the pass is responsible for approximately 10 per cent of the total revenue and for 10 per cent of the increase in revenue, so far as its influence may be directly accounted for. It is probable that the pass, or more particularly the general merchandising methods employed by the Beaver Valley line, has been a factor in the healthy increase in gross revenue shown.

Making Use of an Old Tank Car

MANY years ago the Market Street Railway, San Francisco, Cal., built a tank car to supply oil to various power houses equipped with oil-burning boilers. This car has a cylindrical tank with a capacity of 4,410 gal., and is equipped with an electrically driven pump for discharging the oil. There is no longer any use for the tank car in carrying oil to the power houses, but the railway has found it useful for supplying oil to tanks in various parts of the city for use in oiling



This Tank Car Equipped with Electric Pumps Is Used to Carry Oil for the Market Street Railway of San Francisco

track curves and switches. The oil is pumped into the tank at the Market and Valencia Yard from a large underground storage tank which is supplied by tank trucks of the oil companies. The tank car is in use only about two days a month, but inasmuch as no expense was necessary to put it to its present use it has been found practical and economical.

Energy Consumption of Interurban Cars

Tests Made to Allocate Energy Used Between Cars of Detroit United Railway and Detroit Municipal System When Operating on Tracks of the Latter Indicate Average Consumption of 120.4 Watt-Hours per Ton-Mile—Heater Energy Also Measured

AN ABSTRACT was recently published in this paper of the report of the committee appointed to fix compensation for the right to operate interurban cars of the Detroit United Railway in the city of Detroit. In determining this question, the board of arbitration had to make a study of the energy consumption of the interurban cars on city lines, and a report on the subject by Alfred H. Lovell and James F. Fairman of Ann Arbor, Mich., is included as an appendix in the report of the board. This appendix contains so much information on this interesting subject that it is abstracted below:

Fig. 1 gives the results of tests of energy consumption in kilowatt-hours per car-mile and watt-hours per equipment ton-mile of D.U.R. interurban cars on city runs, made by the Detroit United Railway. In a very large proportion of these runs the energy consumption was lower on the incoming run than on the outgoing run. This was explained by the company as due to the condition that the interurban car often had to follow a city car which made a large number of stops. In consequence, the interurban motorman did a great deal of coasting and running on the series position of the controller, with a consequent saving in power. There were seventy-nine tests averaging 8.87 car-miles each.

The Department of Street Railways of Detroit also submitted results of tests made by the department on cars of its own and also on some Detroit United and some Michigan United cars. The runs for the six department cars tested totaled 13,021.31 car-miles and the tests of the twelve outside cars totaled 437.35 miles. Some of these tests were made with the heaters on, but an estimate was made of the energy taken by them and the amount was deducted from the consumption figures. The results are given in Fig. 2. Then all the cars were grouped in several weight classifications, beginning with 7.5 tons, then 17.5 tons and by 2.5-ton increments to 45 tons. The average energy consumption by groups is given in Fig. 3.

Commenting on these tests, the report says that the points are obviously closer together in the department tests than in the D.U.R. runs. One reason is the much

longer run of the D.S.R. tests. The points on Fig. 3 are very consistent, and as a variety of motor equipment and gear ratios was represented, these values of kilowatt-hours per car-mile are recommended as a basis for energy consumption in city travel for all of the passenger equipment, i.e., both D.S.R. and D.U.R.

The curve of averages drawn in Fig. 3 may be very closely approximated by the formula:

Kilowatt-hours per car-mile equals $1.6 + 0.002 (\text{tons})^2$

The data shown in Figs 1, 2 and 3 were also plotted with the unit for the ordinate changed from kilowatt-

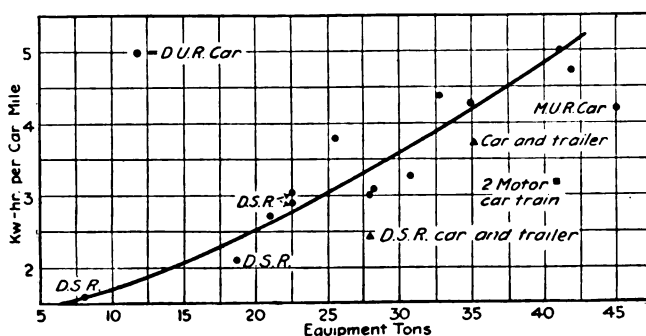


Fig. 2—Energy Consumed on City Passenger Runs, D.S.R. Tests

hours per car-mile to watt-hours per ton-mile. While these points showed a wider dispersion and lack of uniformity than the results in the test just mentioned, the report considers the board is warranted in holding that the average of 120.4 watt-hours per ton-mile, of all the tests on passenger equipment traveled over city lines by both D.U.R. and D.S.R. cars, may properly be accepted.

DAYTON TESTS

In addition to the Detroit tests mentioned, the report refers to energy tests for city runs made in Dayton for the local companies by the Economy Electric Devices Company and described on page 41 of the *ELECTRIC RAILWAY JOURNAL* for July 8, 1922. The data from these tests were plotted in reference to car weight on both a kilowatt-hours per car-mile and watt-hours per ton-mile basis. The results are shown in Figs. 4 and 5.

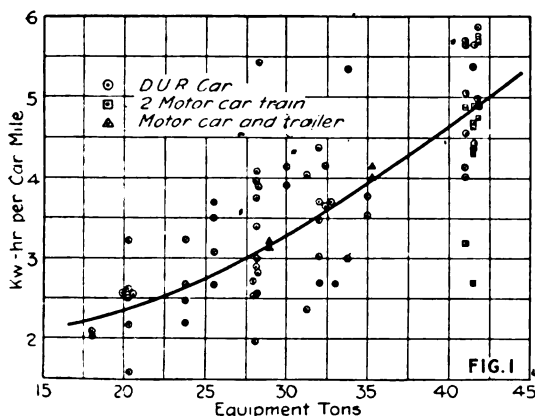


Fig. 1—Energy Consumed on City Passenger Runs, D.U.R. Tests

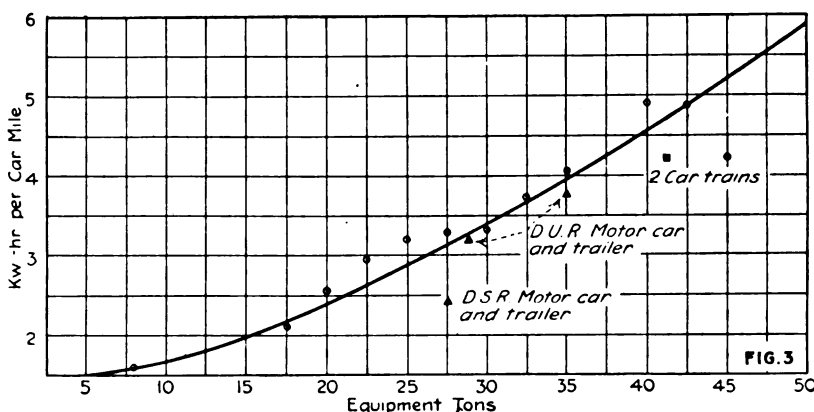


Fig. 3—Energy Consumed on City Passenger Runs, Averages of D.U.R. and D.S.R. Tests

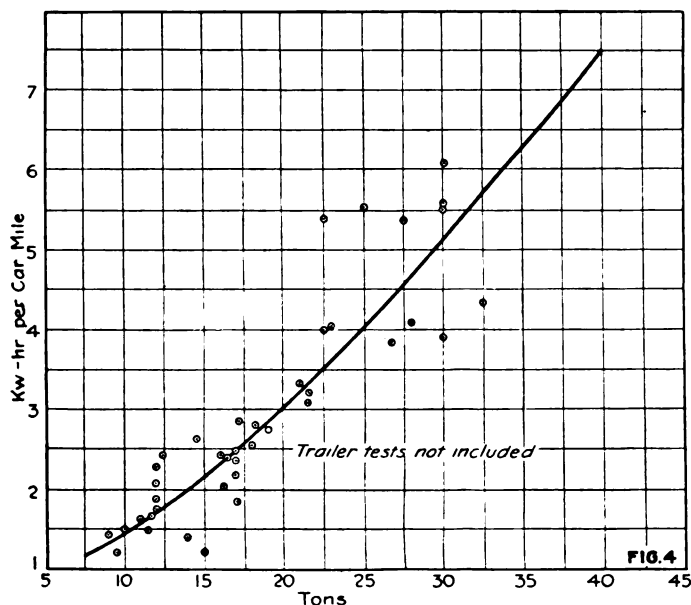


Fig. 4—Energy Consumed on City Passenger Runs on Kilo-watt-Hours per Car-Mile Basis, Dayton

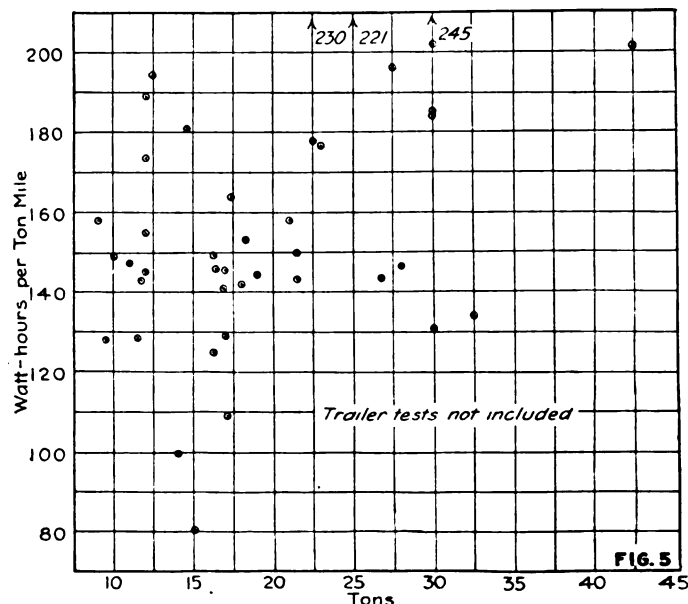


Fig. 5—Energy Consumed on City Passenger Runs on Watt-Hour per Ton-Mile Basis, Dayton

The report considers that these results are distinctly comparable with the Detroit tests, though the figures on the watt-hours per ton-mile basis are more widely scattered and less uniform on the average than those for similar plottings in the Detroit tests. There is also a steeper slope to the average curve in Dayton, as shown in Fig. 8, probably due to the operation being in the downtown district with a stop at every corner.

To determine whether there was any closer agreement in the test results for unit consumption on the longer country runs than in the city runs, a tabulation and plot were made of the passenger car tests on the Flint and D. J. & C. divisions of the D.U.R. These data,

which were taken from the railway exhibit, are plotted in Fig. 6, which show conclusively that there is just as much variation on the runs in the country as in those in the city.

TESTS ON FREIGHT CARS ON CITY RUNS

The report also gives the results of tests of the energy consumption of freight motor cars hauling trains of different lengths varying (with the load on the motor car and its weight included) from a motor car with two trailers and weight of freight carried of 27,449 lb. to a motor car and seven trailers with a load of freight carried of 183,311 lb. The average running

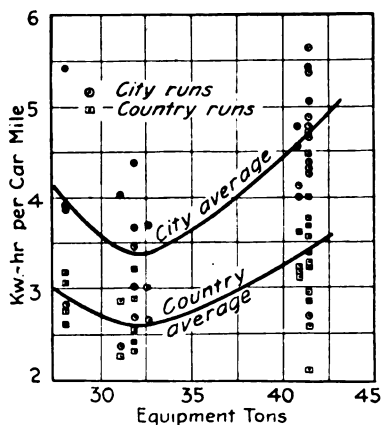


Fig. 6—Comparison of Energy Consumption Tests in City and Country Runs, D.U.R.

Fig. 7—Energy Consumed on City Runs by Freight Cars in Kilo-watt-Hours per Car Mile.

Fig. 9—Energy Consumption of Heaters on Passenger Cars.

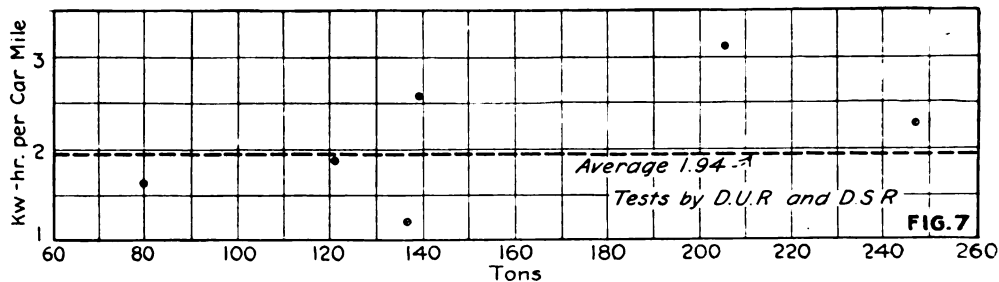


FIG. 7

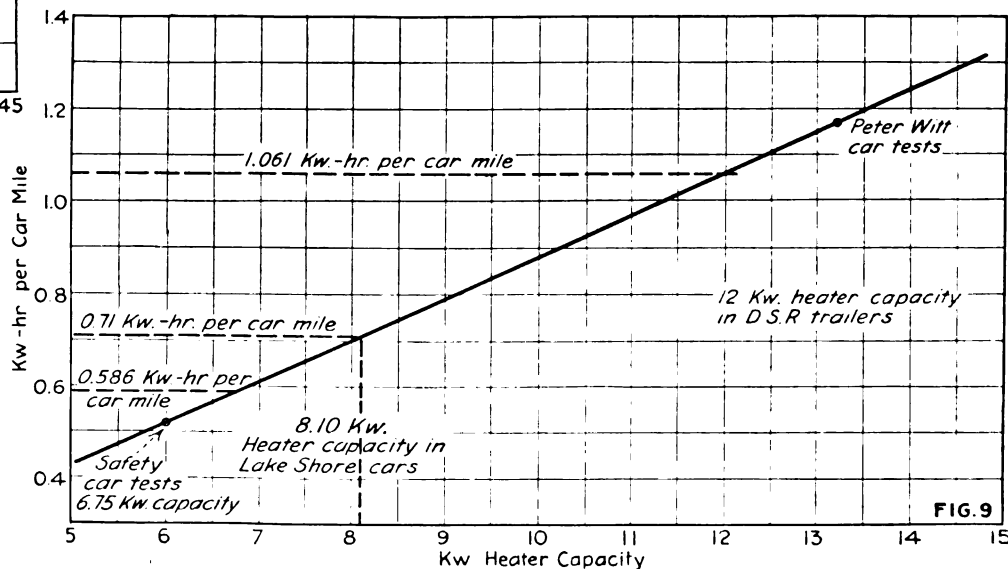


FIG. 9

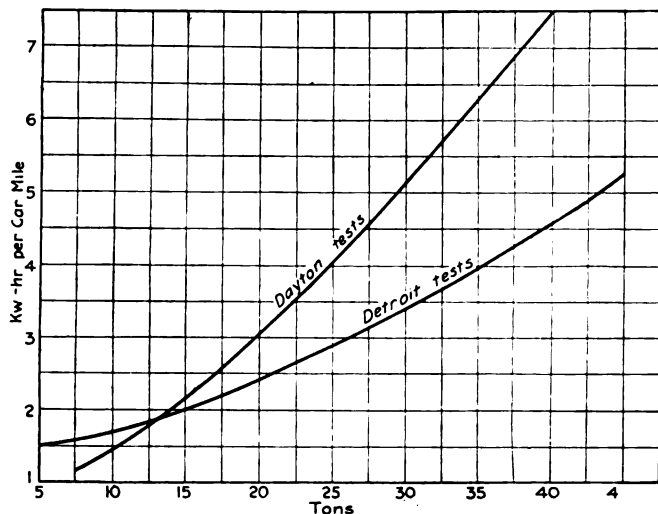


Fig. 8—Comparison of Curve on Figs. 3 and 4

consumption of all these tests, including the energy used in switching during the trip, was 61.6 watt-hours per ton-mile and 1.94 kw.-hr. per car-mile. The latter figures are plotted in Fig. 7.

TESTS ON HEATERS

The report also gives the results of some tests made by the Department of Street Railways on energy consumed in car heating. One series of tests was made with an 8-ton safety car for ten days in November, 1922; thirty days in December, 1922, and January, 1923, and one day in March, 1923. The mean outside temperatures during these three periods were respectively 38.6 deg., 27.4 deg. and 22 deg., all Fahrenheit. The car-miles aggregated 3539.5 and the average consumption was 0.52 kw.-hr. per car-mile.

The tests on the Peter Witt cars were one test of fifty-three days in December, 1922, and January, 1923, and three tests of one day each in March, 1923. During this time the car-miles amounted to 6722.7. The average outside temperatures for these periods respectively were 22.1 deg., 22 deg., 22.3 deg. and 46 deg., and the average consumption was 1.17 kw.-hr. per car-mile.

The report points out that the heater capacity of the 8-ton safety cars is 6 kw. and of the 18.66-ton Peter Witt cars is 13.2 kw., so that if the heater installation is based on the same unit of kilowatts per cubic foot, it might be expected that the energy consumption of the larger cars would be approximately 13.2 divided by 6, or 2.2 times that of the 8-ton cars. Actually, $2.2 \times 0.52 = 1.144$, which is very closely in agreement with the 1.17 kw.-hr. per car-mile average of the Peter Witt car tests. The report points out also that there were a great many variables which entered into the

determination of heater energy consumption, and gives for each of the tests the average stop per run, average time that the doors were open, the average total passengers, on and off, and the average car temperature.

The report points out that about 100 thermostats were destroyed on the system of the Detroit Department of Street Railways by car crews, who wanted the cars warmer than the thermostat cut-out temperature, and there were other thermostats whose adjustment had been tampered with so as to bring the cut-out temperature up to 70 to 75 deg. With such variations in the car temperatures, it would seem impossible to establish uniform energy consumption for the heaters without frequent rigid inspection of the thermostats and season-long tests with a graphic car thermometer in conjunction with the kilowatt-hour meter on each type of equipment. However, the report believes that the figures given are fairly representative of average conditions as they actually prevail in Detroit and recommends the listed average as the basis which the board might choose for the determination of heater energy consumption.

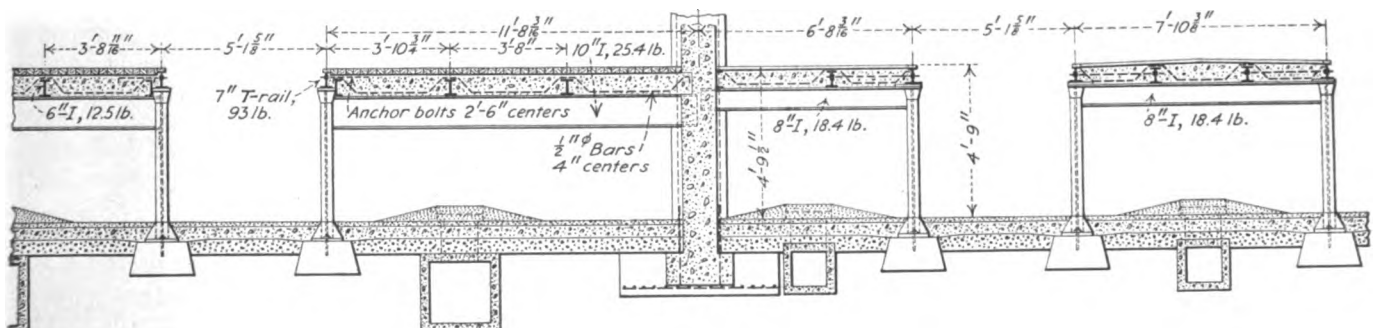
Track Rails Used as Floor Girders in Carhouse

AN INTERESTING type of floor construction has been installed in the Roncesvalles carhouse of the Toronto Transportation Commission. This carhouse was described in *ELECTRIC RAILWAY JOURNAL* for May 4, 1923, page 791. A general illustration of the carhouse is shown in that article.

In ordinary floor construction where pits are used in carhouses, the track rails are independent of the floor framing. This necessitates the use of girders of sufficient strength to carry the entire floor, the track rails either being set on top of the floor or at the edge of the floor section but structurally independent of it. In this construction the rails are used as girders and assist in supporting the floor.

The arrangement is shown in the accompanying drawing. Girder T-rails, 7 in. high, are used. These are supported on vertical columns of I-section. The rails are connected with intermediate I-beams by means of tie rods, and the floor is constructed with concrete. In one section the wearing surface of 2½-in. wood block is laid on top of the concrete, the surface being flush with the head of the rail. In another section a cement flooring is used, which is laid with a hardener to make it wear-resisting.

Several different arrangements are shown, whose application depends on the width of the span and the load to be supported. All of them, however, depend on the use of the rail as one of the beams.



The Rails Are Used as Beams in the Floors of the Roncesvalles Carhouse in Toronto

large part of his earnings outside of New York, his work in New York creates more wealth for this State than he takes out of it.

Local prejudices of this nature obviously should not be allowed to prevent the expansion of local transportation along the lines that will represent the greatest service to the people as a whole and also result in lowering the burden to the citizens of New York City. There is no good reason why communication across the North River should not have been developed in a manner similar to that across the East River. Since the North River is a State boundary line, it has been an artificial barrier which has been permitted to stand in the way of the development of a most convenient and much needed residential area close to New York. Thus there are sixteen street railway and rapid transit tracks over bridges and ten through tubes connecting Manhattan to Long Island, but no bridges and only four such tracks in tubes to New Jersey. These four tube lines to New Jersey were built by private interests, while nearly all the tubes and bridges over the East River were public works.

The Claim Agent Naturally the One to Direct the Safety Movement

TO SOME the immediate direction of the safety campaign on an electric railway system by the claims department seems somewhat inappropriate. Accident prevention, they argue, is largely in the hands of the trainmen, and the superintendent of transportation is much closer to them than is the claim agent. It is the transportation department which trains the men, issues the rules under which they work, and disciplines them in case the rule is not followed. Moreover, the transportation superintendent is closer than the claim agent to the public; he has to study their habits as regards transportation, and he has opportunity through his inspectors and supervisors to know how best to avoid accidents. On the other hand, the work of the claim agent is largely of a legal nature. Let him attend to the settlement of accidents after they occur, but put the direct responsibility for accident reduction on the superintendent of transportation.

This, however, is a partial view of the situation. Undoubtedly, in any safety campaign, active sympathy and hearty co-operation on the part of the superintendent are required, just as they are necessary from all connected with the company, from the president down. But, unless there is a special official, such as a safety engineer, to carry the responsibility of the safety movement, the claim agent is logically the one to do it. Even on the large road, where the engagement of a special safety engineer is warranted, he should work in very close accord with the claim agent.

There are many reasons which point to the claim agent as the one whose duties logically direct his attention to the need of safety and whose experience is invaluable in promoting any safety movement. In the first place, his main duty, broadly speaking, has always been to reduce by every legitimate means the amount of money which the company has to pay out for accident claims, and a common measure of his efficiency is the percentage which the amount so paid out bears to the gross receipts of the company. It is obvious, therefore, that if he can reduce this percentage by preventing accidents, he is working at least as effectively as if he was making the same reduction in court awards—and, of course, actually the work is more effective.

Again, from his study of accident cases, the claim agent is in a peculiarly advantageous position to know the causes of accidents, particularly the causes of accidents for which the law holds an operating company responsible. He knows, for instance, perhaps better than any one else on the property, the time and distance required at different speeds to stop a car under various conditions of rail, the precautions which the conductor or a one-man car operator should take to see that the passenger has safely boarded or left the car before the start is made, and those which should be taken at grade crossings with steam railroads or on his own line, and the time and place at which the warning whistles should be given and the length in seconds of the blast, before the grade crossing is reached.

The consequence of this specialized knowledge is that the claim agent can often see dangerous practices which would not be apparent to the superintendent of transportation. It is natural that this should be so because his mind is constantly on ways and means to reduce accident claims, and his thoughts in this respect are quickened by a recollection of testimony in the court relating to the neglect of precautions, which might have prevented an accident. Of course, it is the aim also of the superintendent of transportation to reduce accidents, as part of his main duty of increasing the transportation receipts and decreasing the transportation expenses, but of these objects, the reduction of accidents, although an important factor, is but one of many.

Luxury Travel May Pay Now Where It Formerly Failed

IN TIMES long past, some electric railway men have tried certain kinds of luxury travel accommodations such as club, parlor and dining cars, which were not then patronized to a sufficient extent to make them profitable. They rather naturally use this as a precedent for not undertaking anything of the sort today. But there is plenty of evidence that times have changed.

People are spending dollars freely now where in pre-war times they were unwilling to part with an extra dime. They may "crab" about an 8-cent street car fare (or their politicians may) but they are perfectly willing to pay the extra price for a parlor car seat or space in a Pullman when traveling even comparatively short distances.

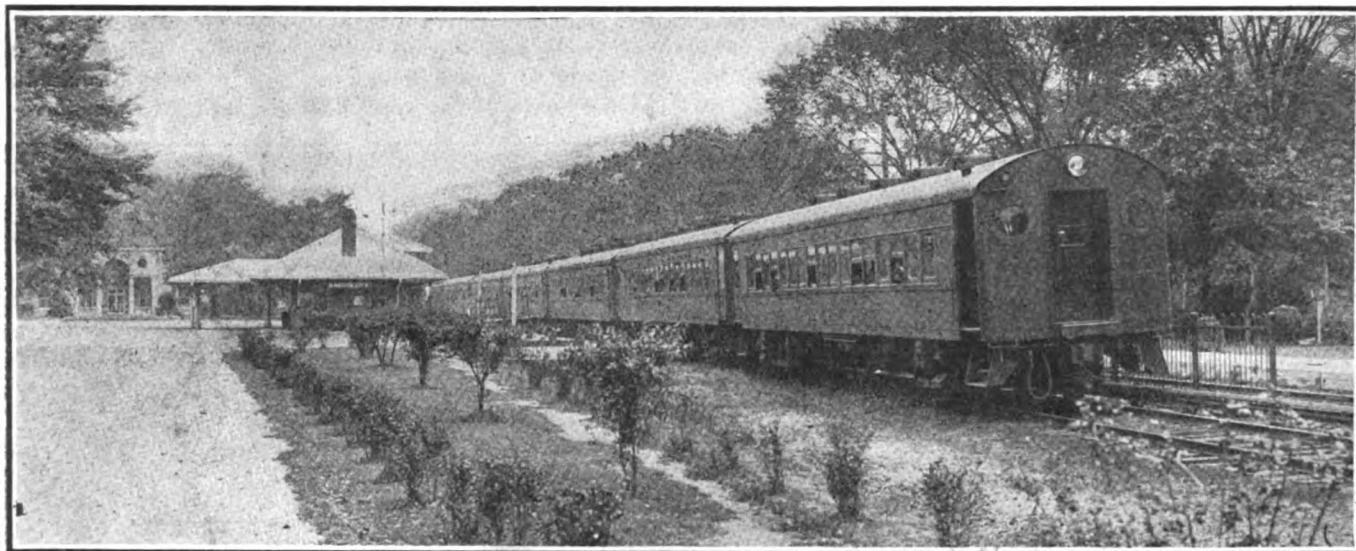
Both the Chicago-Milwaukee and the Indianapolis-Louisville electric lines, which have installed extra-fare parlor or club car service during the past year, have found that the better comfort was well patronized almost from the very start. Both these lines have neighbors which tried something that approximated the same service in pre-war times but was abandoned for lack of patronage. It merely goes to show again that people nowadays demand (and are willing to pay for) something better in transportation than just the ride between two points. They want to make their journey faster and in greater comfort than was formerly expected.

Of course, the main advantage in such luxury service is not in the profit from the chair-car charge or from the meal served en route, which is small if any, but in the fact that it attracts additional passengers to the railway. It is believed that many interurban railways which connect good terminal cities two hours or more apart may now well consider the installation of these various means of providing additional comforts in travel.

Make it easier to travel and more will travel.

Features of New Long Island Cars

Framing Is Designed to Resist Collapse in Collision and Facilitate Repairs When Damaged — Clasp Brakes and Other Improvements in Trucks and Air Brake Equipment Assist in Operation of Long Trains — Two Motors per Car Are Arranged for Tap Field Control



Train of New Multiple-Unit Motor Cars on the Long Island Railroad

SIXTY additional motor cars, pictured herewith, have recently been ordered by the Long Island Railroad for its electrified train service out of New York City. These are being built by the American Car & Foundry Company. With other cars of the same type ordered in 1923 there will be a total of 140 cars of this new type in service.

The new cars follow steam railroad practice closely. They are 64 ft. 5½ in. long and seat seventy-eight passengers. The weight, fully equipped, is 57½ tons, or 1,474 lb. per seat. The accompanying table gives the principal data.

The construction of these cars follows closely the design of the Class T-54 trail cars used by this company, with such modifications as are necessary to adapt them for motors and control.

GENERAL DATA OF LONG ISLAND CARS

Length over buffers	64 ft. 5½ in.
Width over all	9 ft. 10¼ in.
Seating capacity	78
Weight	115,000 lb.
Diameter wheels	36 in.
Maximum speed	54½ m.p.h.

A box girder made up of two 9-in. channels spaced 16½ in., back to back, with a top and bottom plate, form the center sill or stress member. The top cover plate extends the entire length of the channels. The platforms are made of diamond pressed plate. The bottom cover plate extends the entire length of the channels between the platform and end casting. An additional bottom cover plate is used on each end of the car as a reinforcement and this extends from the front end of the draft gear past the center casting to about 2 ft. beyond the cantilevers.

Each end of this box guide is framed in a large steel casting which forms the end of the car. This casting is designed with recesses to accommodate the

spring buffer. There are also framed in at this point two 12-in. I-beams which form the diaphragm posts and extend to the roof. The roof purlins are riveted to the tops of these. This center sill takes all bumping strains and prevents buckling of the car, while the large 12-in. I-beams prevent telescoping.

The end construction of the cars is of flat sheet steel. This type of construction was adopted due to the ease with which repairs can be made after damage. Experience of the railway indicates that the ends of steel cars are the parts most frequently damaged. With flat plate construction, repairs can be made very quickly and it is not necessary to wait for specially curved or shaped sections ordered from the car manufacturers nor to keep on hand a large stock of special replacement parts.

The cars have single outside sheets, lined with three-ply Salamander, with inside finishing sheets. The roofs are of the arch type and are constructed of single sheets, lined with three-ply Salamander, with an inside finish sheet.

The trucks are a one-piece cast steel type, manufactured by the Commonwealth Steel Company, St. Louis, Mo. This is an equalizer type. All wearing surfaces are provided with detachable wearing plates. All parts are very liberally designed in order to reduce maintenance repairs. The trucks are provided with clasp brakes and the brake rigging is very substantially constructed. A particular feature is the method of taking up slack. Instead of the usual screw and nut or turnbuckle arrangement, a split collar clamps over two rods. The rods have a succession of rings, and the inside of the split clamp has projections which fit between these. Slack is taken up by loosening the clamping nuts of the collar and sliding this along to a new position on the rod. The slack is automatically taken up by an air slack adjuster, and with the type of con-

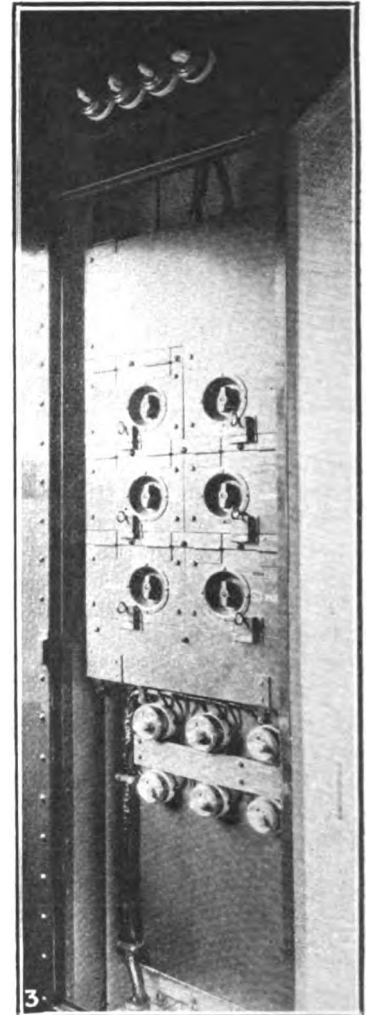
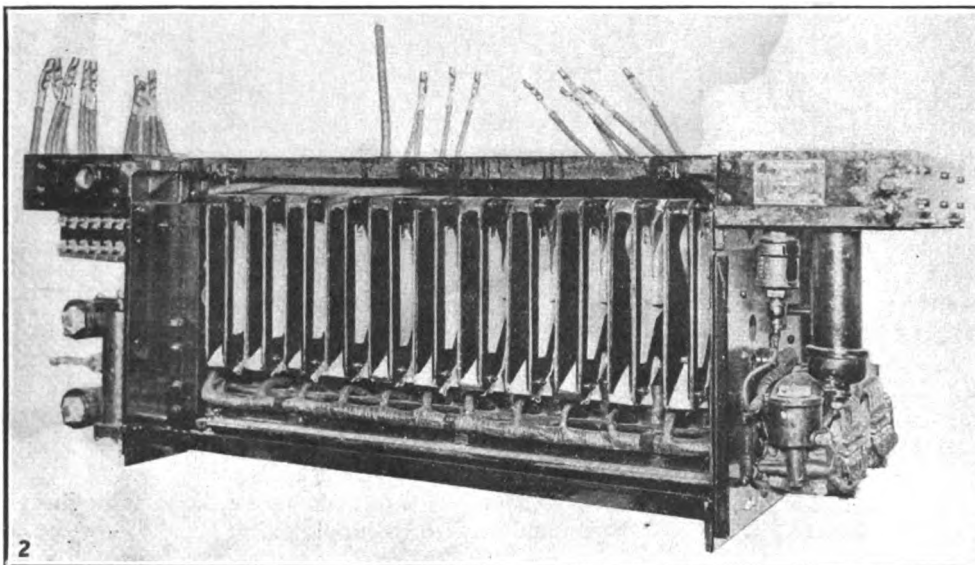
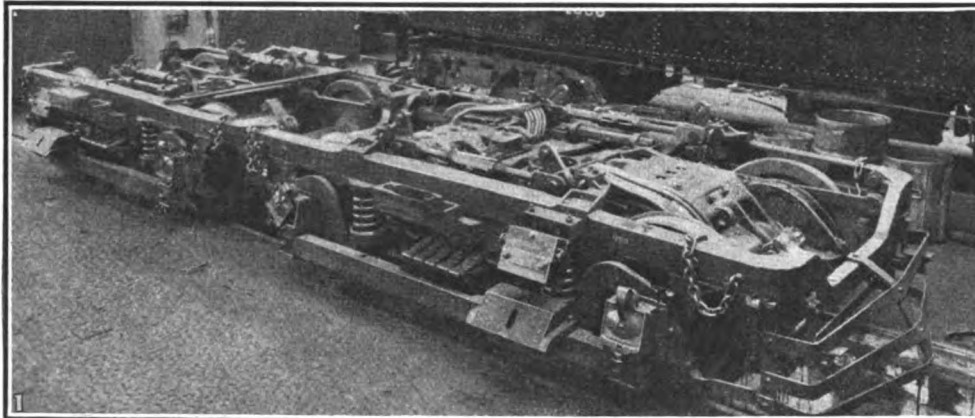
struction used it is found possible to wear out a set of brake shoes without hand adjustment.

Some improvements have been made in the air brake equipment over that used on older type cars. The Long Island Railroad operates many ten-car trains in its electrified service, and the time at terminals for making up and getting these trains into service is quite limited during rush hours. Difficulty was experienced in some cases where cars were coupled to others with low reservoir pressure. The coupling to these cars usually caused the brakes to go into emergency, and considerable time was taken for the compressors to pump up sufficiently to allow the brakes to release.

equipment includes the U-12 Universal valve, M 19 C brake valve, and D 3 F compressor of 35-ft. capacity.

The lighting of the cars is from twenty-five lamps, each of 23 watts capacity. These are arranged in two rows on either side of the aisle. The lamp sockets are mounted on the purlins and the lighting wires run inside these.

A new feature of the auxiliary equipment is the provision of a safety switchboard for the light, heater and compressor circuits. In this construction the switch controlling each individual circuit is inclosed in an insulated compartment, so that a short circuit in one portion will not spread to adjacent circuits. Pro-



No. 1. The Trucks Are of the One-Piece Cast Steel Type, with Clasp Brakes and Detachable Wearing Plates

No. 2. New Type Switch Group Used on Long Island Cars with Covers Removed

No. 3. The Compartments of This Safety Switchboard Panel Cannot Be Opened with the Circuits Energized

It was also found desirable to shorten the time of release of brakes after an ordinary emergency application.

The main reservoir line was increased from $\frac{3}{4}$ in. to 1 in. and the branch pipe to the motorman's brake valve was also increased to 1 in. A new feed valve was designed for this service, which is much larger, has larger ports and a larger piston. The air pressure which acts on the diaphragm is brake pipe pressure from the motorman's brake valve. Through the improvements made in piping and air brake equipment the time of releasing brakes after an emergency application was reduced greatly.

The air brake equipment is Westinghouse type AMU. In addition to the changes just described, the

vision is also made so that the covers of the switch compartment cannot be opened until the switches are in their "off" position. This is accomplished by a slot in the pocket surrounding the operating handle. To open the box, the handle must pass through this slot, and this can only take place with the switch in the off-position. This type of switch construction also permits of an improved arrangement of switchboard connections. These are all of flat copper strips and the main feeder and load side of the switches are in inclosed compartments.

The motor equipment for each car consists of two Westinghouse type 308-G-1 motors of the standard box frame type. The main field windings of the motor are arranged for tap field connections on the last run-

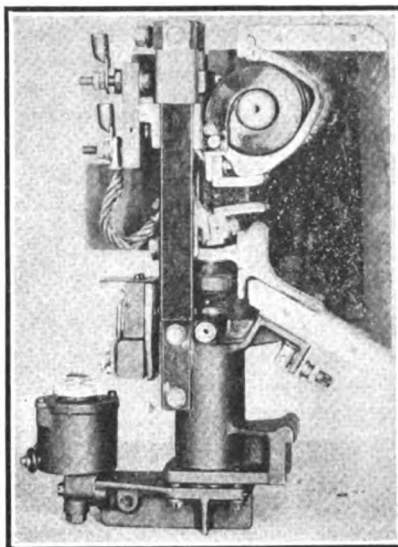
ning point. The housings and gear cases are especially designed to permit the use of clasp brakes. These motors are very similar to the Westinghouse type 308 motors, which have been previously used by the Long Island Railroad on all its motor cars.

The control equipment is Westinghouse type ABF, arranged for automatic acceleration and field control of the motors. This control will operate with all existing equipment of the company. Electro-pneumatic switches are used and energy for operating the control apparatus is furnished by 14-volt storage batteries, two of which are provided per car, so as to be charged and used on alternate days.

The main motor control consists essentially of thirteen unit switches of the HL electro-pneumatic type. Automatic acceleration is accomplished by the use of the usual current limit relay, which regulates the movement of a sequence drum, which in turn energizes the magnet coils of the electro-pneumatic unit switches in the required sequence.

The main control circuits are arranged with a total of twelve steps. Seven of these are for series operation and five for parallel operation. Bridging method of transition is used between series and parallel. The normal or tapped field connection for the motors is effective only on the last full parallel running point. In addition to the control group, a line switch or circuit breaker is used which has parts interchangeable with those in the switch group. The use of two overload relays to operate the line switch, one connected in each leg of the motor circuit, provides for more sensitive operation than the usual type of single overload trips, since each is set at approximately one-half the current value required for a single relay. Either or both of the relays can be reset by a single reset coil, which is energized from a plug switch located in the master controller.

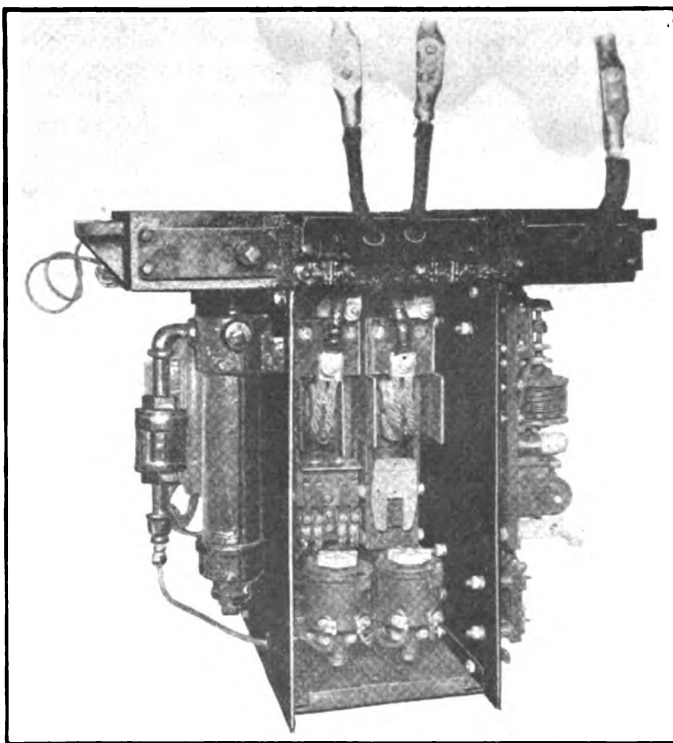
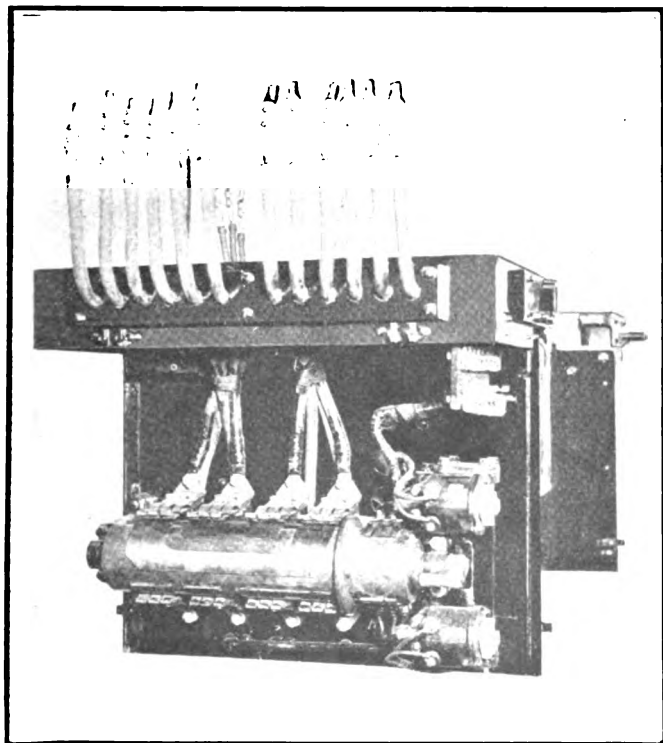
The main control is mounted in a skeleton frame completely inclosed by removable covers. On one end of the group is the sequence switch and limit relay,



Unit Switch with One Side of Arc Chute Removed to Show Construction

while the other end contains an electro-pneumatically operated drum type reverser. The sequence switch, which energizes the magnet coils of the controller in the proper order, consists of a drum which is operated by air cylinders through a rack and spur gear with teeth cut at an angle of 45 deg. Entrance of air into the operating cylinders is controlled by two magnet valves, one for "on" and the other for "off" motion.

The operation is on the balanced air principle. If both "on" and "off" magnets are energized at the same time, movement of the drum takes place, since the air pressure on the piston is unbalanced by air being admitted through the "on" valve and released through the "off" valve. Movement is stopped by de-energizing the "off" magnet, which will then admit air and cause the pressure on the piston to become balanced. To move the drum in successive steps, it is only necessary to energize the "on" magnet from the supply circuit and the "off" magnet through the limit relay contact. When both magnets are de-energized, as when the master controller is in the "off" position, the air in the "on" magnet cylinder is exhausted to atmospheric pressure, while that in the "off" magnet valve is at reservoir pressure, thus moving the drum to the "off" position and holding it there.



At Left, the Drum-Type Reverser Is Mounted on One End of the Switch Group. At Right, Type of Line Switch Used on New Cars

The control circuits of the magnet coils are so interlocked that rotation of the drum is permitted unless the line switch is closed, and as the line switch when once opened cannot be closed until the drum returns to the first operating position, independent operation of either is eliminated.

Bargain Sale of Passes Proves Profitable

Reduced Rates on the Lines of the Beaver Valley Traction Company During August, 1923, Produced Higher Revenue than Normal Rates During the Same Month in 1922

FOR five weeks beginning Aug. 6, 1923, the Beaver Valley Traction Company, New Brighton, Pa., sold the all-zone pass, normally costing \$2, for \$1.50. At the same time the price of the two-zone pass, normally \$1.60, was reduced to \$1.50. The purpose of this bargain sale of passes was to stimulate passenger traffic, which is ordinarily at a low ebb during that season. That considerable success attended this effort of the company is shown by the fact that the gross revenue for August, 1923, was approximately 15 per cent greater than for August of the year before.

A somewhat similar experiment had been made by the Beaver Valley Traction Company during the previous spring. At that time free tickets were given as a bonus to those who bought the weekly pass. With an 85-cent pass two free tickets were given, with a \$1.60 pass three free tickets, and with a \$2 pass five free tickets. During the weeks from May 4 to May 25 this scheme was in effect. Financially the result was inconsequential. That is to say, the gross revenue remained about the same. The extra riding on the free tickets was apparently about balanced by the extra riding for cash. As a whole, however, the pass-buying public was pleased to get this appreciation of its patronage and the company profited on the score of public relations if not in the matter of revenue.

Probably the reason why the free ticket scheme was not more popular was that the saving was contingent upon the buyer of the pass having a companion. His own pass was sufficient to take him anywhere at any time, and unless he desired to pay the fare of some

	Four Weeks July 9 to Aug. 5	Four Weeks Aug. 6 to Sept. 2	Four Weeks Sept 10 to Oct. 7
\$0.85 passes.....	1,153	985	1,096
\$1.60 passes.....	412	.....	385
Universal passes.....	1,805	3,414	1,889
Total passes.....	3,370	4,399	3,370
Adult passenger revenue..	\$5,248	\$5,944	\$5,423

other person he would have no use for the free tickets. It was thought, therefore, that a more favorable reaction would be obtained if a method were devised to give a direct saving to the buyer of the pass. To this end the reduced rate sale of passes during August was tried with price reductions as stated at the beginning of this article.

A comparison of the three periods of four weeks each, that preceding the bargain sale, that during the bargain sale, and the one immediately thereafter, shows that the revenue was considerably greater during the bargain sale.

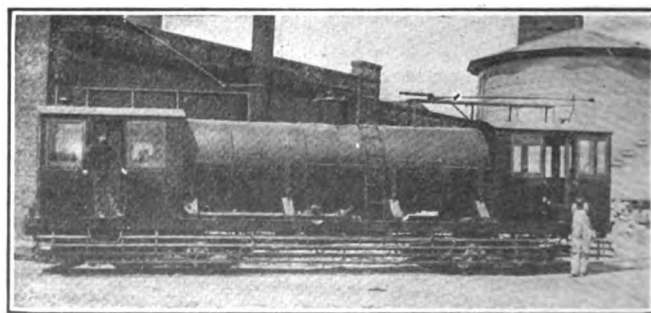
It is seen from the figures in the accompanying table

that the number of one-zone passholders was materially reduced during the period of the bargain sale, and even after its ending the number did not increase to its former size. The number of two-zone pass holders was of course reduced to nothing, because the price was made the same as that for the universal pass. A great increase occurred in the number of people buying the universal pass, and to some extent this increase appears to have been retained after the passes returned to their normal price. It was noticeable also that although August is usually the poorest month of the year the total number of pass buyers and the gross revenue were higher during the four weeks from Aug. 6 to Sept. 2 than during the four weeks just before or after.

The beneficial effect on the income of the Beaver Valley Traction Company and the Pittsburgh & Beaver Street Railway, operated by the former company, can be seen from the fact that in July, 1922, the gross revenue was \$53,707, and in July, 1923, \$57,815, or an increase of 9½ per cent. In August, 1922, the gross revenue was \$48,448, while in August, 1923, it was \$55,490, or an increase of 14½ per cent over the preceding year. Thus August, 1923, almost equaled July in revenue, whereas the year before August was considerably lower than July, showing the value of the pass sale. It may be noted that the pass is responsible for approximately 10 per cent of the total revenue and for 10 per cent of the increase in revenue, so far as its influence may be directly accounted for. It is probable that the pass, or more particularly the general merchandising methods employed by the Beaver Valley line, has been a factor in the healthy increase in gross revenue shown.

Making Use of an Old Tank Car

MANY years ago the Market Street Railway, San Francisco, Cal., built a tank car to supply oil to various power houses equipped with oil-burning boilers. This car has a cylindrical tank with a capacity of 4,410 gal., and is equipped with an electrically driven pump for discharging the oil. There is no longer any use for the tank car in carrying oil to the power houses, but the railway has found it useful for supplying oil to tanks in various parts of the city for use in oiling



This Tank Car Equipped with Electric Pumps Is Used to Carry Oil for the Market Street Railway of San Francisco

track curves and switches. The oil is pumped into the tank at the Market and Valencia Yard from a large underground storage tank which is supplied by tank trucks of the oil companies. The tank car is in use only about two days a month, but inasmuch as no expense was necessary to put it to its present use it has been found practical and economical.

Energy Consumption of Interurban Cars

Tests Made to Allocate Energy Used Between Cars of Detroit United Railway and Detroit Municipal System When Operating on Tracks of the Latter Indicate Average Consumption of 120.4 Watt-Hours per Ton-Mile—Heater Energy Also Measured

AN ABSTRACT was recently published in this paper of the report of the committee appointed to fix compensation for the right to operate interurban cars of the Detroit United Railway in the city of Detroit. In determining this question, the board of arbitration had to make a study of the energy consumption of the interurban cars on city lines, and a report on the subject by Alfred H. Lovell and James F. Fairman of Ann Arbor, Mich., is included as an appendix in the report of the board. This appendix contains so much information on this interesting subject that it is abstracted below:

Fig. 1 gives the results of tests of energy consumption in kilowatt-hours per car-mile and watt-hours per equipment ton-mile of D.U.R. interurban cars on city runs, made by the Detroit United Railway. In a very large proportion of these runs the energy consumption was lower on the incoming run than on the outgoing run. This was explained by the company as due to the condition that the interurban car often had to follow a city car which made a large number of stops. In consequence, the interurban motorman did a great deal of coasting and running on the series position of the controller, with a consequent saving in power. There were seventy-nine tests averaging 8.87 car-miles each.

The Department of Street Railways of Detroit also submitted results of tests made by the department on cars of its own and also on some Detroit United and some Michigan United cars. The runs for the six department cars tested totaled 13,021.31 car-miles and the tests of the twelve outside cars totaled 437.35 miles. Some of these tests were made with the heaters on, but an estimate was made of the energy taken by them and the amount was deducted from the consumption figures. The results are given in Fig. 2. Then all the cars were grouped in several weight classifications, beginning with 7.5 tons, then 17.5 tons and by 2.5-ton increments to 45 tons. The average energy consumption by groups is given in Fig. 3.

Commenting on these tests, the report says that the points are obviously closer together in the department tests than in the D.U.R. runs. One reason is the much

longer run of the D.S.R. tests. The points on Fig. 3 are very consistent, and as a variety of motor equipment and gear ratios was represented, these values of kilowatt-hours per car-mile are recommended as a basis for energy consumption in city travel for all of the passenger equipment, i.e., both D.S.R. and D.U.R.

The curve of averages drawn in Fig. 3 may be very closely approximated by the formula:

Kilowatt-hours per car-mile equals $1.6 + 0.002 (\text{tons})^2$

The data shown in Figs 1, 2 and 3 were also plotted with the unit for the ordinate changed from kilowatt-

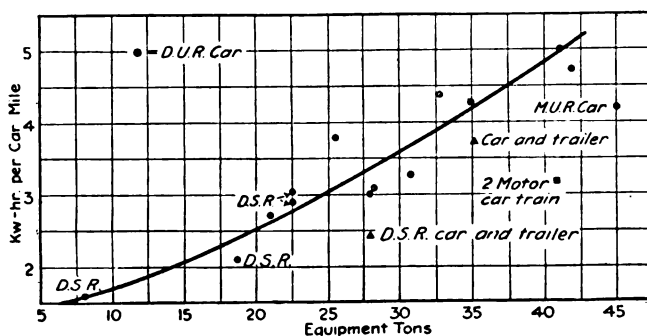


Fig. 2—Energy Consumed on City Passenger Runs, D.S.R. Tests

hours per car-mile to watt-hours per ton-mile. While these points showed a wider dispersion and lack of uniformity than the results in the test just mentioned, the report considers the board is warranted in holding that the average of 120.4 watt-hours per ton-mile, of all the tests on passenger equipment traveled over city lines by both D.U.R. and D.S.R. cars, may properly be accepted.

DAYTON TESTS

In addition to the Detroit tests mentioned, the report refers to energy tests for city runs made in Dayton for the local companies by the Economy Electric Devices Company and described on page 41 of the ELECTRIC RAILWAY JOURNAL for July 8, 1922. The data from these tests were plotted in reference to car weight on both a kilowatt-hours per car-mile and watt-hours per ton-mile basis. The results are shown in Figs. 4 and 5.

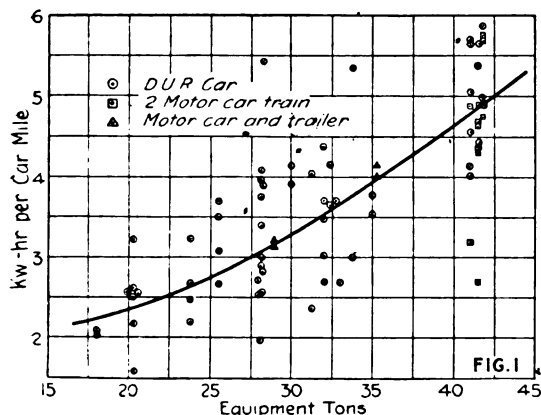


Fig. 1—Energy Consumed on City Passenger Runs, D.U.R. Tests

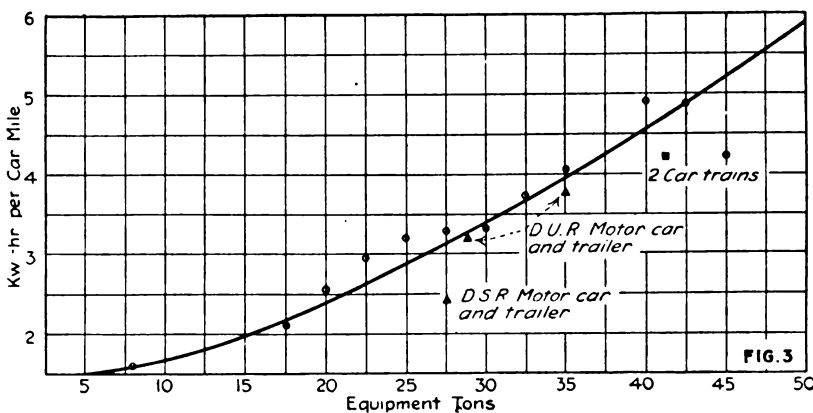


Fig. 3—Energy Consumed on City Passenger Runs, Averages of D.U.R. and D.S.R. Tests

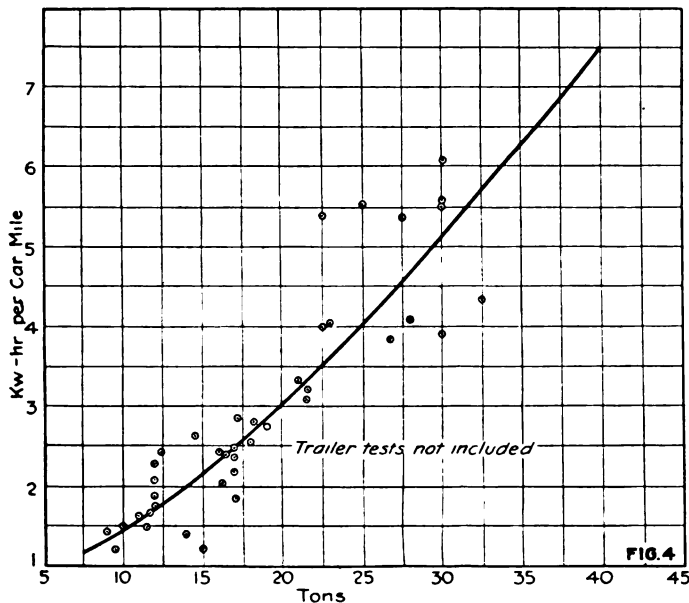


Fig. 4—Energy Consumed on City Passenger Runs on Kilowatt-Hours per Car-Mile Basis, Dayton

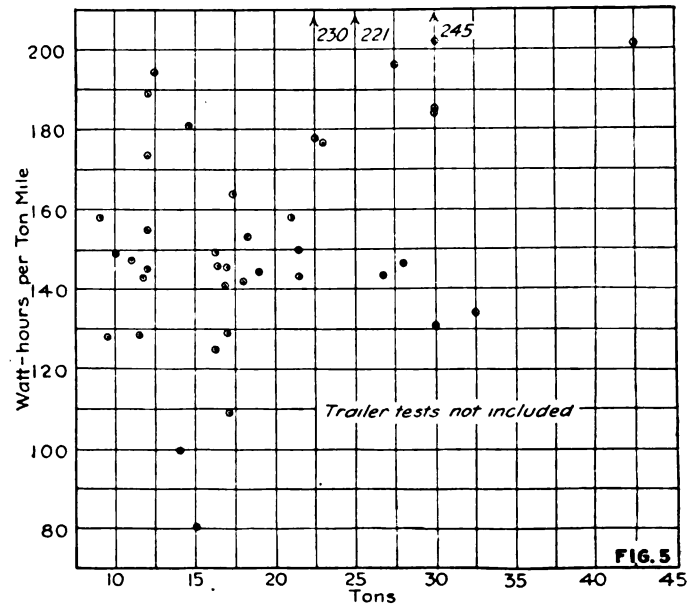


Fig. 5—Energy Consumed on City Passenger Runs on Watt-Hour per Ton-Mile Basis, Dayton

The report considers that these results are distinctly comparable with the Detroit tests, though the figures on the watt-hours per ton-mile basis are more widely scattered and less uniform on the average than those for similar plottings in the Detroit tests. There is also a steeper slope to the average curve in Dayton, as shown in Fig. 8, probably due to the operation being in the downtown district with a stop at every corner.

To determine whether there was any closer agreement in the test results for unit consumption on the longer country runs than in the city runs, a tabulation and plot were made of the passenger car tests on the Flint and D. J. & C. divisions of the D.U.R. These data,

which were taken from the railway exhibit, are plotted in Fig. 6, which show conclusively that there is just as much variation on the runs in the country as in those in the city.

TESTS ON FREIGHT CARS ON CITY RUNS

The report also gives the results of tests of the energy consumption of freight motor cars hauling trains of different lengths varying (with the load on the motor car and its weight included) from a motor car with two trailers and weight of freight carried of 27,449 lb. to a motor car and seven trailers with a load of freight carried of 183,311 lb. The average running

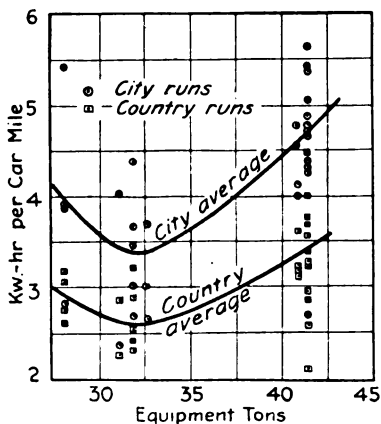


Fig. 6—Comparison of Energy Consumption Tests in City and Country Runs, D.U.R.

Fig. 7—Energy Consumed on City Runs by Freight Cars in Kilowatt-Hours per Car Mile.

Fig. 9—Energy Consumption of Heaters on Passenger Cars.

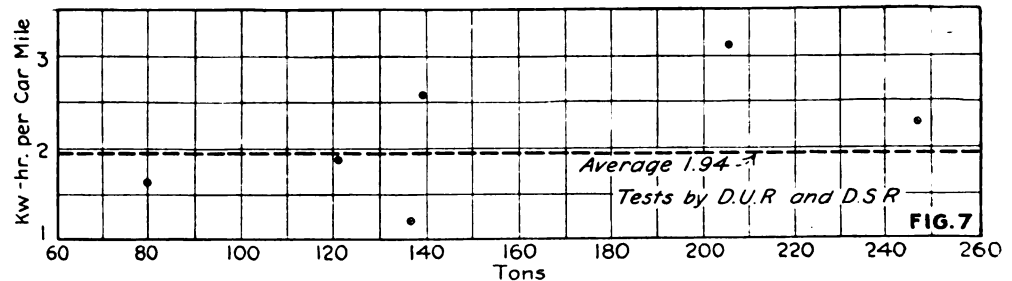


FIG. 7

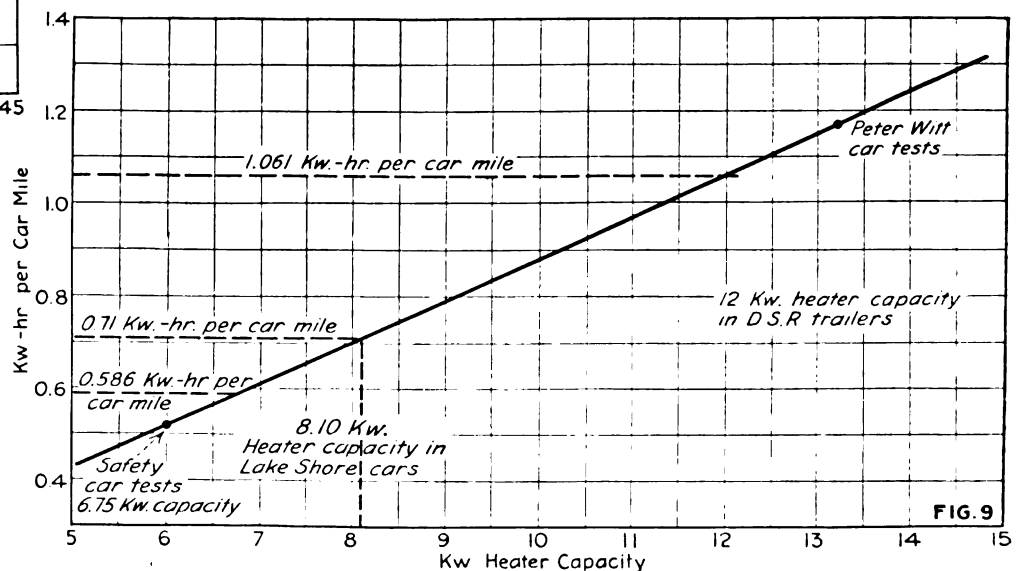


FIG. 9

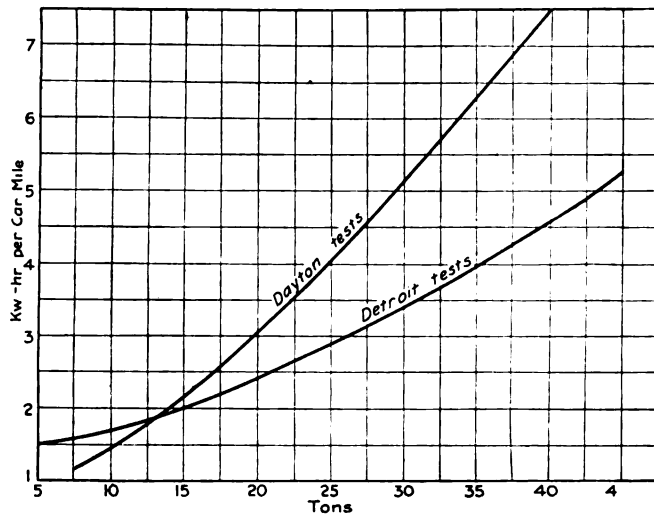


Fig. 8—Comparison of Curve on Figs. 3 and 4

consumption of all these tests, including the energy used in switching during the trip, was 61.6 watt-hours per ton-mile and 1.94 kw.-hr. per car-mile. The latter figures are plotted in Fig. 7.

TESTS ON HEATERS

The report also gives the results of some tests made by the Department of Street Railways on energy consumed in car heating. One series of tests was made with an 8-ton safety car for ten days in November, 1922; thirty days in December, 1922, and January, 1923, and one day in March, 1923. The mean outside temperatures during these three periods were respectively 38.6 deg., 27.4 deg. and 22 deg., all Fahrenheit. The car-miles aggregated 3539.5 and the average consumption was 0.52 kw.-hr. per car-mile.

The tests on the Peter Witt cars were one test of fifty-three days in December, 1922, and January, 1923, and three tests of one day each in March, 1923. During this time the car-miles amounted to 6722.7. The average outside temperatures for these periods respectively were 22.1 deg., 22 deg., 22.3 deg. and 46 deg., and the average consumption was 1.17 kw.-hr. per car-mile.

The report points out that the heater capacity of the 8-ton safety cars is 6 kw. and of the 18.66-ton Peter Witt cars is 13.2 kw., so that if the heater installation is based on the same unit of kilowatts per cubic foot, it might be expected that the energy consumption of the larger cars would be approximately 13.2 divided by 6, or 2.2 times that of the 8-ton cars. Actually, $2.2 \times 0.52 = 1.144$, which is very closely in agreement with the 1.17 kw.-hr. per car-mile average of the Peter Witt car tests. The report points out also that there were a great many variables which entered into the

determination of heater energy consumption, and gives for each of the tests the average stop per run, average time that the doors were open, the average total passengers, on and off, and the average car temperature.

The report points out that about 100 thermostats were destroyed on the system of the Detroit Department of Street Railways by car crews, who wanted the cars warmer than the thermostat cut-out temperature, and there were other thermostats whose adjustment had been tampered with so as to bring the cut-out temperature up to 70 to 75 deg. With such variations in the car temperatures, it would seem impossible to establish uniform energy consumption for the heaters without frequent rigid inspection of the thermostats and season-long tests with a graphic car thermometer in conjunction with the kilowatt-hour meter on each type of equipment. However, the report believes that the figures given are fairly representative of average conditions as they actually prevail in Detroit and recommends the listed average as the basis which the board might choose for the determination of heater energy consumption.

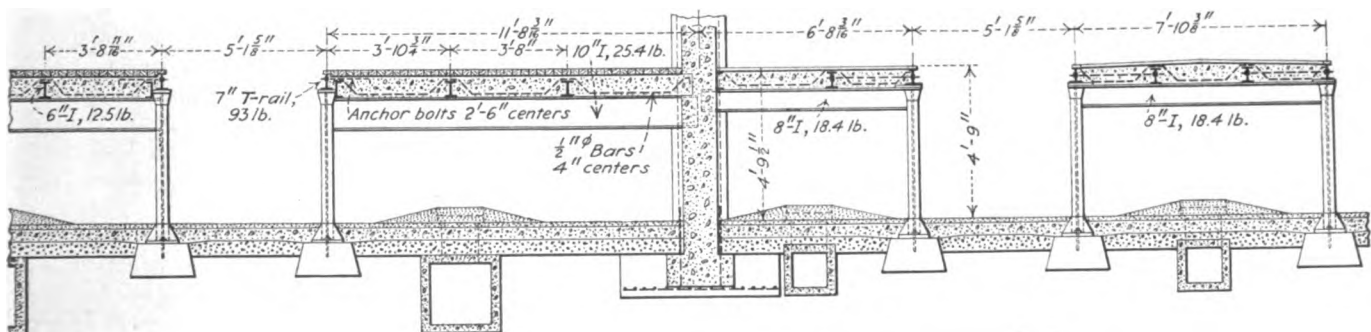
Track Rails Used as Floor Girders in Carhouse

AN INTERESTING type of floor construction has been installed in the Roncesvalles carhouse of the Toronto Transportation Commission. This carhouse was described in *ELECTRIC RAILWAY JOURNAL* for May 4, 1923, page 791. A general illustration of the carhouse is shown in that article.

In ordinary floor construction where pits are used in carhouses, the track rails are independent of the floor framing. This necessitates the use of girders of sufficient strength to carry the entire floor, the track rails either being set on top of the floor or at the edge of the floor section but structurally independent of it. In this construction the rails are used as girders and assist in supporting the floor.

The arrangement is shown in the accompanying drawing. Girder T-rails, 7 in. high, are used. These are supported on vertical columns of I-section. The rails are connected with intermediate I-beams by means of tie rods, and the floor is constructed with concrete. In one section the wearing surface of $2\frac{1}{2}$ -in. wood block is laid on top of the concrete, the surface being flush with the head of the rail. In another section a cement flooring is used, which is laid with a hardener to make it wear-resisting.

Several different arrangements are shown, whose application depends on the width of the span and the load to be supported. All of them, however, depend on the use of the rail as one of the beams.



The Rails Are Used as Beams in the Floors of the Roncesvalles Carhouse in Toronto

New Trip Envelope Saves Time

A SIMPLIFICATION in the method of handling conductors' trip sheets inaugurated in the early part of the year, has proved satisfactory on the Tacoma Railway & Power Company's system. The number of forms that it is necessary to use has been

reduced from four to only one. Under the old system, an operator was required to make out a daily report card on which was shown the number of passengers, the beginning and ending fare-box readings for both cash and tokens, the number of tickets and the number of transfers for each half trip. At the end of his run, he was required to turn in to the receiver an envelope containing the transfers, a second envelope containing his report and all tickets collected, and a small card stating the amount of cash he was delivering. One envelope now does the work of all these forms. Fare-box readings, however, are taken only at the beginning and ending of the day's work, instead of at the end of each half-trip. The saving of time accomplished is an important item, especially at periods of the day when it is difficult to maintain the schedule speed. Another advantage is that the simplification increases the likelihood of the conductors making correct reports and aids the receiver in detecting arithmetical mistakes. Under the old system, it frequently happened that the operator neglected to turn in one or more of the various forms required.

Operator Will Fill Out Separate Report for Each Car and Each Route

TACOMA RAILWAY & POWER CO.
CONDUCTOR'S DAILY REPORT

Day Monday Car No. 200
Date Sept. 24, 1923 Run No. 4
Route Point Defiance Box No. 113
Conductor Geo. A. Pythe No. 295
Motorman _____ No. _____

Started From	Leaving Time	Readings	Distance
Barn	2:58p	Fare Box—Cash	
17th	3:10	When Left 372 90	
P. D.	3:35	When Taken 361 00	11 50
17th	4:40	Fare Box—Metal Tks.	
P. D.	5:25	When Left 8463	
17th	6:10	When Taken 8434	29
P. D.	6:55	Ball Face—Card Tks.	
17th	7:42	When Left 7692	
P. D.	8:24	When Taken 7651	41
17th	9:06	Ball Face—Passes	
P. D.	9:48	When Left 2615	
17th	10:30	When Taken 2572	243
P. D.	11:12		
17th	11:54		
Barn	12:04		

Summary		No. Tks.	Amount
Cash Fares	\$ 11.50	115	
Metal Tickets	29		
Commutation Tickets—Inside	1		
Commutation Tickets—Outside	3		
School Tickets	31		
City Tickets	4		
Employee Tickets—Munic.	2		
Employee Tickets—Company	3		
Transfers—Munic.	7		
Transfers—P. T. Co.	2		
Transfers—Others	18		
Dead Heads—Munic.	3		
Dead Heads—Company	7		
Weekly Passes	243		
Total	461		

Cash Receipts	
Currency	2 00
Gold Coin	
Silver Dollars	3 00
Silver Halfes	
Silver Quarters	2 00
Dimes	4 00
Nickels	90
Pennies	
Total Cash	\$ 11.50
Metal Tickets	29

Receiving Clerk _____

New Envelope Which Simplifies Accounting for Tacoma Conductors

work, instead of at the end of each half-trip. The saving of time accomplished is an important item, especially at periods of the day when it is difficult to maintain the schedule speed. Another advantage is that the simplification increases the likelihood of the conductors making correct reports and aids the receiver in detecting arithmetical mistakes. Under the old system, it frequently happened that the operator neglected to turn in one or more of the various forms required.

Reducing Fire Risk in the London Tubes

GREAT care is exercised to avoid any fire in the "tubes" of the Underground Railways of London. Journals are frequently packed and are watched carefully. A hot box might cause a panic and a panic at "crush hour" might have serious consequences. Great care is exercised in keeping the tubes clean. A certain amount of inflammable material is dropped at stations and in cars by passengers. Certain amounts of foreign material also find their way into the tubes by way of the elevator shafts and stairways, as well as through the shafts in which the ventilating fans are operated. In addition, a mysterious fluff accumulates. It is highly inflammable and is disposed of with much difficulty, as

it is sucked along with the trains. The source of this material is in doubt, but it is believed to be lint from the clothing of the passengers. When millions of people crowd on and off cars, there is bound to be some brushing off of the fabrics of which clothing is made. In the aggregate this amounts to a surprising quantity.

Contest Produces Good Advertisements

ELECTRIC railway interests figured actively in a recent advertising contest among employees of properties managed by Stone & Webster, Inc., Boston, Mass., designed to stimulate the production of "copy" calculated to "sell" the idea of utility service. Two classes of advertisements were embodied in the contest: Material for a series of not less than six newspaper advertisements designed to sell any of the service of appliances offered by the Stone & Webster companies, and ideas which could be used in utility advertisements.

C. L. Greer, superintendent of overhead, Galveston-Houston Electric Railway, Houston, Tex., won the first prize in the second part for a group of ideas for increasing popular appreciation of the value of electricity. The second prize (tied) went to G. C. Harvey, clerk in the track department, El Paso Electric Railway, El Paso, Tex., on the use of electric appliances in the home, and to L. K. Hawson, assistant superintendent gas department, Nova Scotia Tramways & Power Company, Ltd., Halifax, N. S., on the same subject.

The railway material which won the second prize is now being featured by the Columbus Electric & Power Company, Columbus, Ga. It is composed of six advertisements emphasizing the comfort, time-saving features, freedom, independence of weather conditions, safety and service availability of electric transportation. Each one is illustrated in the simplest possible manner by a drawing of the two parallel rails of a single straight track, thus emphasizing the direct, speedy service of the street railway. Contrast is drawn between the removal of responsibility from the passenger and the burdens of automobile driving "in traffic"; between the low cost of trolley service and the expensive luxury of motoring in areas served by electric railway lines.

Throughout the set the readiness-to-serve policy of the railway and the convenience and comfort of car travel are featured. It is expected that other railway systems operated by Stone & Webster, Inc., will shortly utilize these advertisements in their own traffic and good-will seeking activities.

Park Anywhere— Go and Come as You Like

You are not bound by a catalogue of rules when you ride your street cars.

Nor does the comparatively unimportant act of "getting there" demand much of your attention. Ride your street car. Forget all the petty details of traffic and "road etiquette." Then you'll arrive at your destination with mind clear and ready to fill your mission.

This company renders three vital services to this community—
ELECTRIC CURRENT, GAS and STREET CAR SERVICE
—such service made more reliable by the equipment which is maintained for supplying the other.

It's common sense! The actual saving will also show in your personal bank balance.

Ride your street cars—Regularly.

Columbus Electric & Power Company

G. E. HUTCHINS, Wholesale Power. THOS. L. MOSE, Ad's Sales Mgr. Retail. R. M. HARDING, Manager.

MODERN ILLUMINATION IS DAYLIGHT PLUS

One of a Series of Six Prize-Winning Advertisements in Contest Conducted by Stone & Webster

Unusual Terminal Layout Facilitates Passenger Movement

New Interurban Station of the Bamberger Electric Railroad and the Salt Lake & Utah Railroad at Salt Lake City Has Waiting Room on the Street Level and Train Platforms Underground—Separate Ramps Are Provided for Incoming and Outgoing Passengers

THE new interurban station for electric railroads recently completed at Salt Lake City, Utah, is a good example of up-to-date terminal design from a traffic standpoint as well as being of pleasing appearance. Convenience and comfort have been effectively combined in its construction.

This station is the terminus of the Bamberger Electric Railroad and the Salt Lake & Utah Railroad, two interurban lines serving the territory adjacent to Salt Lake City. It is the outcome of the merging of the terminal interests of the two railways, and has been achieved after much effort on the part of former Governor Simon Bamberger and A. J. Orem, the respective presidents of the two roads.

The building is of reinforced concrete construction faced with gray vitrified brick. It is Colonial in style and is three stories high. The use of the basement as a passenger concourse, however, has the effect of an extra story.

The track level is 12 ft. below the sidewalk grade and is reached by carborundum finished ramps of easy inclination, as well as by stairways at both ends of the waiting room. In this story are situated the express and baggage accommodations, the trainmen's comfort station, and the mechanical equipment of the building. There is also a spacious concourse with outlet gates to the various train platforms and approximately 12,000 ft. of floor space available for commercial purposes.

The main waiting room is on the street level and is accessible directly from the sidewalk without steps or inclines of any sort. Its windows overlook the incoming and outgoing train yards. The station faces toward the north on South Temple Street. The entrance is at the east end of the waiting room because the major part of the railway patronage comes from that

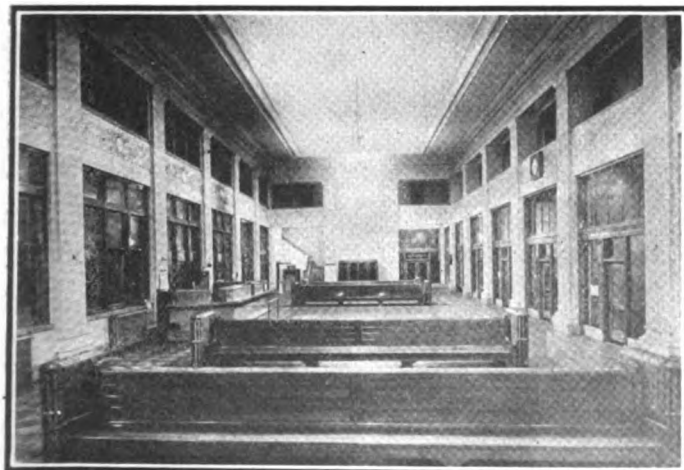


Combined Terminal of the Bamberger Electric Railroad and the Salt Lake & Utah Railroad

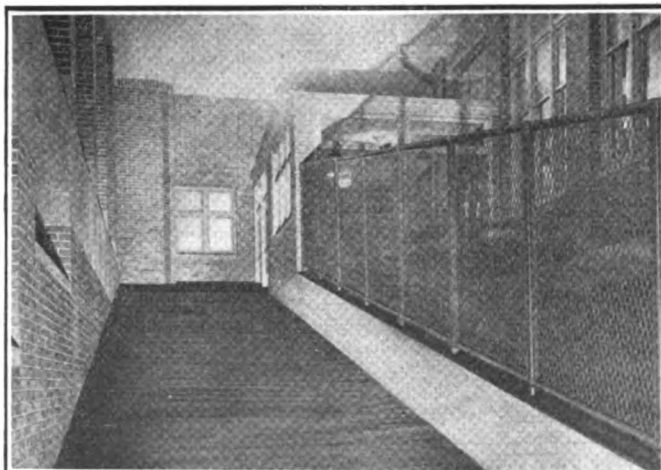
direction. On the south side of the waiting room are the ramps leading to the track level. Directly in the line of passenger movement is situated the ticket office. Announcement boards occupy the wall opposite the entrance, where they can be seen at a glance by hurrying patrons.

The principal exit from the waiting room is at the west end, directly opposite the ramp leading up from the incoming tracks. This movement is, therefore, entirely separate from the passenger movement in the other direction, which is at the east end. The separate and direct lanes of passage which are thus created for incoming and outgoing traffic tend to eliminate confusion and facilitate the movement of the crowds without congestion. These travel lanes, together with the designation of exits to trains and the one-way communicating doors automatically guide the unfamiliar travelers along their way and without confusion.

By virtue of a southerly exposure the waiting room



The Waiting Room Is Two Stories in Height and Overlooks the Train Yards

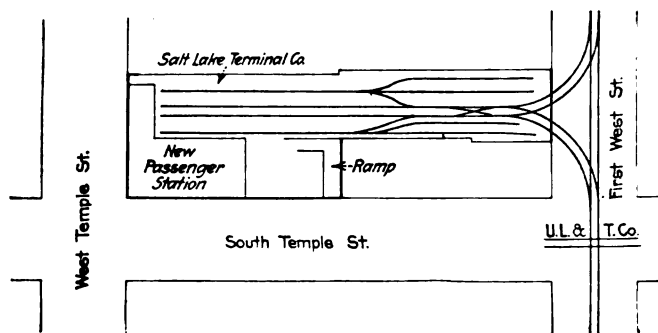


Separate Ramps Are Provided for Incoming and Outgoing Passengers

is brilliantly day lighted during the heavy traffic hours. The ceiling is two stories high, as shown in the accompanying illustration. Convenient ladies' retiring room and men's smoking room are provided. The main waiting room is finished in imitation of Caen stone, with a marble travertine floor. The woodwork and roomy seats are of natural quartered oak.

Adjoining the waiting room on the west is situated a modernly equipped kitchen and dining room, where excellent meals are served at popular prices. Here also are telephone and telegraph accommodations. Along the north side of the waiting room are several small stores catering to passengers as well as to the general public. Entrances to these stores from both waiting room and street are provided. A drug store occupies the corner location. A barber shop is located in the wing having street frontage on the east. Dining, lunch, news, refreshment, tobacco and drug concessions are under lease and are handled by the Walsh News Company, of which John W. Walsh, a director of the Bamberger road, is the head. Additional stores occupy

the street frontage on the east side of the building. General dispatcher's offices are reached through a corridor from the waiting room or by a stairway from the track level for the convenience of trainmen. These occupy the west exposure overlooking the yard trackage. The second story, with the excep-



The Tracks Enter the Station 12 Ft. Below the Street Level

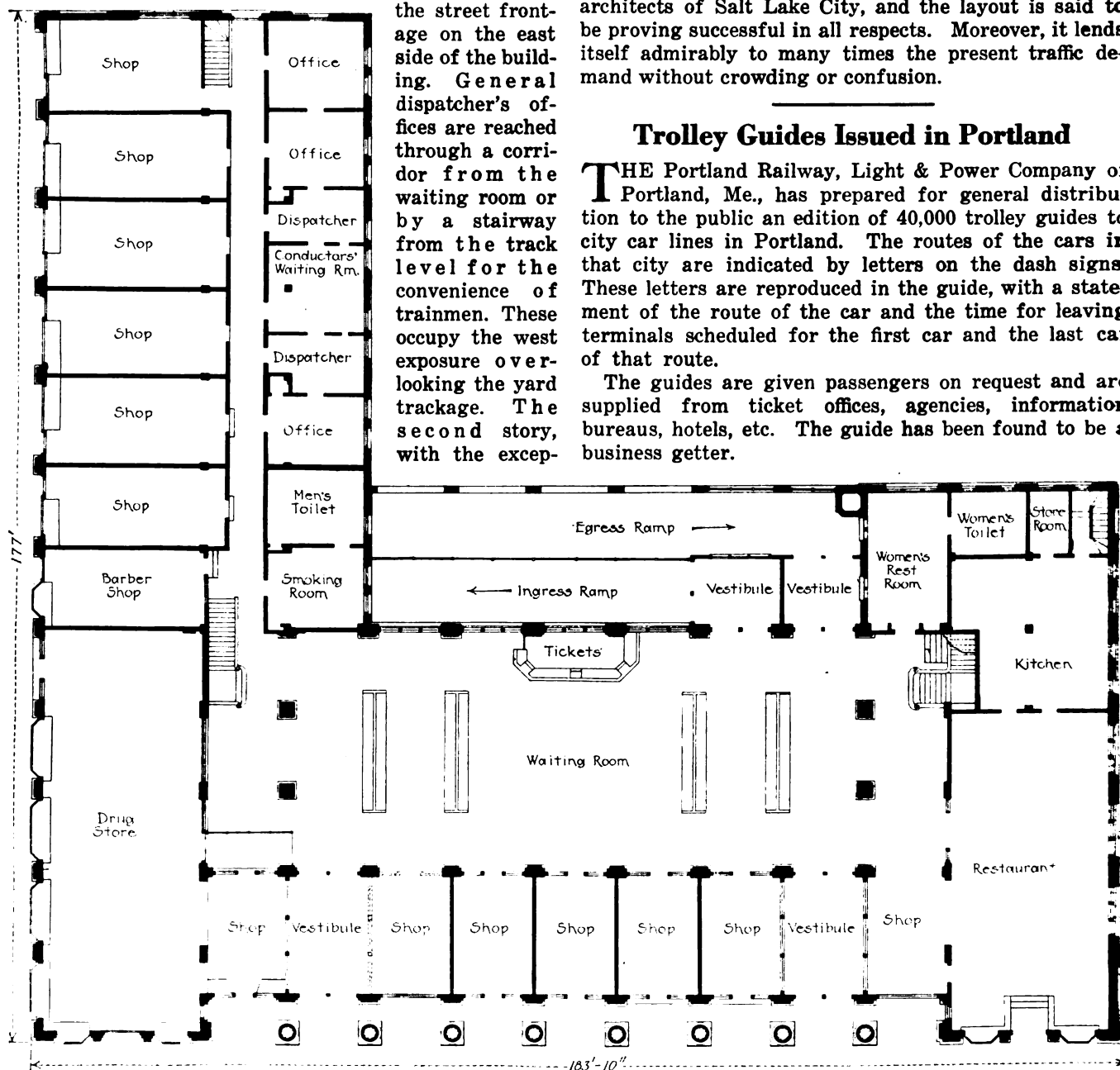
tion of the offices of the traffic departments of the two roads, and the area embracing the waiting room, is devoted to public office space. It is planned at some future time to have all the general offices of the two railroads located in the new building.

The building was designed by Young & Hansen, architects of Salt Lake City, and the layout is said to be proving successful in all respects. Moreover, it lends itself admirably to many times the present traffic demand without crowding or confusion.

Trolley Guides Issued in Portland

THE Portland Railway, Light & Power Company of Portland, Me., has prepared for general distribution to the public an edition of 40,000 trolley guides to city car lines in Portland. The routes of the cars in that city are indicated by letters on the dash signs. These letters are reproduced in the guide, with a statement of the route of the car and the time for leaving terminals scheduled for the first car and the last car of that route.

The guides are given passengers on request and are supplied from ticket offices, agencies, information bureaus, hotels, etc. The guide has been found to be a business getter.



Inbound and Outbound Passenger Movements Are at Opposite Ends of the Station, Entrance Being at Left and Exit at Right

Employees Organization Begins Safety Campaign

Kansas City Railways Will Direct Safety Activities Through Committees Developed by Employees' Representation Plan—Investigation of All Accidents to Be a Feature

A NEW safety organization has been effected on the Kansas City Railways which is the first step toward what is hoped to be a widespread campaign for the prevention of accidents and of injuries to the general public. The company is beginning with its own men, training them to notice in every way how accidents occur and how they may be prevented, and to take steps to see that they do not recur.

The organization of the employees' "representation plan" described in *ELECTRIC RAILWAY JOURNAL* Jan. 12, 1924, page 63, forms the nucleus for the safety organization. By adding men in some departments and divisions an organization for handling the safety-first campaign was completed. Committees are definitely appointed on safety work, so as to have an explicit objective in this direction.

The general manager of the company, F. G. Buffe, is the chairman of the central committee, which handles specific problems designated by him, and Egbert B. Sanders, publicity manager of the company, is the secretary. This central committee meets regularly every two weeks at stated times, receiving reports from division committees, from the general transportation committee, or the general mechanical committee. It passes on suggestions for the installation of safeguards where such suggestions cannot be handled directly by the division committee. It also studies and passes on all accident report records submitted by the division committees. If the suggestions are adopted they are acted on at once, while if rejected they are sent back to the division submitting them with reasons for the rejection. If the adoption of any suggestion seems imperative either the division superintendent or the department head will act upon it without waiting for a meeting of the central committee.

The personnel of the division committees under the employees' representation plan forms the next step in the safety committee organization. In the case of the transportation department and the general mechanical department, reports of the divisional committees would go through the general committee for these departments before going to the central committee, whereas in the power plant, way and structures department, and electrical distribution the reports would go directly to the central committee. The number of persons serving on these divisional committees is small, and except in a few instances the membership of the representation plan committee was sufficient to carry on the safety work.

Each of these committees has two sub-committees appointed by its chairman; one to make inspection of its particular plant or division once every two weeks; the other to investigate every accident no matter of what nature, inquiring into every detail. These committees meet regularly every two weeks at a stated time, so far as possible just previous to the meeting of the central committee. They pass on suggestions and recommendations for safety, which if approved are forwarded to the central safety committee. All mem-

bers of these committees are expected to report all unsafe conditions in their departments and careless practices among fellow workmen; to look after new employees, showing them hazards to be avoided in their work, and to make definite reports to the central committee.

It is planned that mass meetings of workmen will be held, possibly at the noon hour, for the purpose of hearing addresses by outsiders, possibly having also moving pictures and other features.

The company has designed and constructed in the shops some new safety bulletin boards, which are electrically illuminated and will display bulletins furnished by the National Safety Council and by the company. These bulletins will be placed in all divisions of the company's plant. The idea is to protect the men on the cars, in the shops, and on the tracks. Whenever an accident occurs, the result of an investigation on it will be placed on every bulletin board. A description of the accident will be given, how it occurred, what damage resulted and how the accident might have been avoided.

A program for the safety organization and work was outlined by the Kansas City Safety Council, of which Julian Harvey is director. Mr. Harvey was connected with the Kansas City Railways several years ago when it undertook safety work, and is familiar with the company's personnel and operations.

"Cheapest Taxi in the World" Featured in Boston Elevated Motion Pictures

UNDER the title "Boston in Motion," a motion picture film that was prepared for the Boston Elevated Railway has been exhibited this winter in some twenty-five movie houses in Greater Boston. After this theater showing, lasting about four weeks, the company made an arrangement for free street exhibits. An auto truck was arranged with screens on three sides so that the film could be seen by three groups of spectators at once, and the truck makes stops of fifteen minutes at different points to show the film. These trips are made between 6 and 10:30 p.m. The number of persons watching the exhibit from the truck have at times been as many as 1,500. The purpose of the film is to make clear some of the more common causes of street traffic congestion and to point the way toward better service through the co-operation of car riders.

The film opens with an explanation by a uniformed employee of the leading causes of interrupted service, the camera showing a would-be car rider of the well set-up American business man type asking the reason for a gap in the car schedule. On the screen are shown animated diagrams of regular and irregular car movement on a complete surface route between a suburban terminal and one of the fast transit transfer stations, the effect of a truck breakdown on the street being clearly indicated. Overcrowding of following cars by the tendency of riders to try to board the first units following the tie-up is shown, with suggestions as to how passengers can help the service by distributing themselves more evenly among the accumulated units which follow a tie-up in close order.

The traffic scenes are followed by a number of snow-fighting pictures, and it is pointed out that thirty snowfalls may cost the company a million dollars in clearing the streets for general service. How fires hold up roll-

ing stock movement is well indicated, and the film then gives the onlooker visual evidence of the delaying effect of drawbridge openings, of which Boston has about 100 per day. Even a "two by four" tug, the film title states, will tie up the movement of rapid transit and surface traffic on important arteries of travel. Views of the company's power station, tie-treating plant and construction yard are included, and the management points out that through its equipment the car rider in Greater Boston who pays 5 or 10 cents for his ride has "the cheapest taxi in the world." The film ends with a procession of employees of twenty-five or more years of service.

The educational value of the film is considered by the management to be well worth its cost.

Adjustable Fastening for Motorman's Stool

THE Connecticut Company, New Haven, Conn., found it desirable to fasten the motormen's stools in position on the car platforms so that they could not be removed. A permanent fastening, however, had the



Fastening for Motorman's Stool Provides for Adjustment of Position

objection of inconvenience to some motormen, as the stool's location in relation to the controller and air brake valves would vary somewhat with the length of the operator's legs. The adjustable fastening shown in the illustration has overcome this objection.

A rod is fastened to one of the bottom cross-pieces of the stool. This is threaded so as to receive a nut. The fastening to the upright stanchion is by means of a short piece of pipe screwed into a tee in the stanchion. The end of the short pipe has a cap with a hole just large enough to receive the rod. By inserting the rod through the cap and fastening with a nut before the cap is screwed in position a fastening is provided so that the rod will slide in and out of the pipe but cannot be entirely removed, as the nut holds it when it comes up against the cap. With this fastening, the stool can be placed in any position convenient for the operator, but it cannot be removed entirely from the platform.

Reversed Operation Prevents Accidents

ON A stretch of double track between the town of Lemoyne, Pa., and the bridge across the Susquehanna River to Harrisburg the Valley Railways has reversed the normal direction of operation. At this point the tracks are alongside an important highway with a steep grade. If operated according to the usual right-hand method, cars inbound to Harrisburg would be going down hill immediately adjacent to vehicles coming up hill on the state road. It is in order to eliminate the possibility of collision that the direction of traffic on the two tracks has been reversed. Cars out-

bound from the city take the left-hand track going up hill alongside the vehicles bound in the same direction, while inbound cars take the inside track away from vehicular traffic. As this stretch of double track is only about half a mile long the cars soon get back to normal operation when the end of this turnout is reached.

The Readers' Forum

How the Plan to Publish Railway Bus Matter in "Journal" Is Viewed

THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

MILWAUKEE, WIS., Jan. 24, 1924.

To the Editors:

I am entirely in accord with the new policy of the ELECTRIC RAILWAY JOURNAL in publishing matter relating to the motor bus. I have a feeling that the step was too long delayed. The motor bus has been an important factor in urban and interurban transportation service for several years. This transportation business cannot be properly "journalized" by your paper or any other paper which ignores the motor bus except to bewail the inroads it makes when left to competitors to use against the railway industry. The industry needs and will welcome information respecting this rapidly growing adjunct to organized and efficient transportation service.

S. B. WAY,

Vice-President and General Manager.

MARKET STREET RAILWAY COMPANY

SAN FRANCISCO, CAL., Jan. 23, 1924.

To the Editors:

In compliance with your telegraphic request of Jan. 14, I take pleasure in expressing my agreement with your policy on publishing bus articles. I trust that the following paragraphs will make clear my views on this subject:

The transportation of a maximum number of passengers with a maximum degree of safety, convenience and comfort at a minimum fare is the aim of our industry. This aim does not commit us eternally to the use of electricity, or to the use of any of the methods we now regard as orthodox; but for the immediate present and for a reasonable distance into the future it looks as though we shall find electricity our best motive power, in the main, and trolleys and tracks indispensable in the densely populated districts. However, it seems that in the interests of economy we may dispense with tracks and even with electricity in the outlying districts and still remain faithful to our aim.

Holding such views as I do, I cannot see how I could take exception to the ELECTRIC RAILWAY JOURNAL'S policy, editorially expressed, of devoting space to the operation of buses by electric railway companies as an auxiliary or feeder service.

Before our industry had learned that buses could be used as allies I was opposed to the discussion of bus operation in the pages of the JOURNAL; however, now that we are finding that we can employ such auxiliaries, let us learn to do so most effectively.

M. McCANTS,
General Manager.

Association News & Discussions

Central Association in Annual Meeting

Modernization Is the Most Promising Course for Interurbans—Design of Outdoor Substations, Use of Resistance Losses for Car Heating and Rules for Repair of Interchanged Freight Equipment Are Discussed—Summer Meeting to Be at Cedar Point, Ohio

CONVENING in the capital city of the Hoosier State, on Jan. 24 and 25, the delegates to the annual meeting of the Central Electric Railway Association devoted their time very largely to subjects of special interest to interurban railways. Important reports of committees on repair of freight cars while on foreign lines, and on insurance coverage, were interspersed with papers on engineering subjects and on the general economic prospect for the interurban. Papers by Dr. Thomas Conway, Jr., Prof. D. D. Ewing and B. W. Kerr are published elsewhere in this issue.

In the absence of President J. P. Barnes, Vice-President Harry Reid presided. A proposal of the executive committee for the appointment of a special committee of seven members to be known as the policy committee was adopted by the association. The report of the secretary-treasurer was read and accepted. As shown by the report, the membership of the association on Dec. 31, 1923, was sixty-three interurban companies, operating 5,310 miles of track; five city lines and two lake steamer lines. A supply membership of 143 was reported. The work done during the year by the Central Electric Railway Accountants' Association, Central Electric Railway Traffic Association, and Central Electric Railway Engineering Council were also summarized in the report.

NEW OFFICERS OF C.E.R.A.

A nominating committee consisting of C. L. Henry, S. D. Hutchins and W. S. Rodger proposed the following men for officers and members of the executive committee for the ensuing year and their election followed: President, Harry Reid, president Interstate Public Service Company, Indianapolis; first vice-president, Frank R. Coates, New York; second vice-president, G. K. Jeffries, Indianapolis.

Executive committee: James P. Barnes, S. W. Greenland, Robert I. Todd, A. C. Blinn, H. A. Nicholl, C. N. Wilcoxon, W. S. Rodger, F. W. Coen, J. F. Collins, M. B. Lambert, James H. Drew and K. A. George.

As second vice-president, Mr. Jeffries is ex officio chairman of the Engineering Council.

The new executive committee, meeting at the close of the session on Friday, decided to hold the summer meeting at Cedar Point, Ohio, on July 10 and 11.

C. B. Auel, Westinghouse Electric & Manufacturing Company, read a paper

entitled "Efficiency and Common Sense," in which he pointed out some of the general phases of our industrial and economic situation, emphasizing the importance of economy and conservation. The importance of reforestation as a national problem of interest to all industries was urged by John Benham, vice-president, International Register Company, and he proposed the following resolution which was adopted by the association:

Whereas the government of the United States has of recent years been giving increasing effort for the preservation of the forests of this country, and endeavoring so to regulate the timber cut as to conserve our lumber supply, it has also been engaged in an effort to reforestate the cut-over and other lands not well adapted for crop raising, but of value for the creating of new forests. Now, therefore,

BE IT RESOLVED, That the members of the Central Electric Railway Association hereby express to the President of the United States and to their Senators and Representatives in Congress, their concern for the future lumber supply, and their deep interest in this great work, and that they look with favor on the work that has thus far been accomplished and urge the appropriation of the needed funds that may be wisely and profitably used for the larger support and extension of this work so far as the appropriation can consistently be made.

A written discussion of Mr. Auel's paper, prepared by R. N. Graham, manager railways, Pennsylvania-Ohio Electric Company, was read by R. Moses, assistant general superintendent of that property. Mr. Graham's discussion dealt with the efficient operation of railway properties and brought out the passing of the old type "hardshell" railway operator. He mentioned clean and neat appearing cars and the elimination of unnecessary manufacturing work in the shops as important factors in a program of efficient railway operation.

Further discussion by W. S. Rodger, general traffic manager Detroit United Lines, dealt with the need for applying the principles of scientific management to railway operations, and with the value of ideas originating with the rank and file of the operating personnel.

Dr. Conway prefaced his paper with a discussion of the potential possibilities of an adverse decision by the Interstate Commerce Commission on the application of Sec. 15-A of the transportation act to interurban railways, and urged every road to be represented at the hearing in Washington on March 19. His paper was discussed by C. N. Wilcoxon, president Chicago, Lake Shore & South Bend Railway, who mentioned past exploitation and bad engineering as the cause of some present railway difficulties. By modernizing their prop-

erty and equipment, and merchandising their service, he felt that many interurban railways could still obtain a place in the sun.

In the absence of F. R. Coates, chairman of the Engineering Council, A. Schlesinger, superintendent distribution and substations, Terre Haute, Indianapolis & Eastern Traction Company, presided at the afternoon session. A report of the committee which was appointed to prepare a set of rules for the repair of interchanged freight cars was read by E. B. Gunn, superintendent and master mechanic of the Western Ohio Railway. The report was accepted by the association for printing and distribution to the membership with a view toward obtaining additional suggestions and criticisms so as to enable a final set of rules to be prepared and adopted.

On Friday morning Charles L. Henry, president Indianapolis & Cincinnati Traction Company and chairman of the committee on national relations of the American Electric Railway Association, addressed the meeting on the many ways in which the electric railways come in contact with the national government, and particularly on the importance of Sec. 15-A of the transportation act of 1920. This latter was treated quite fully in *ELECTRIC RAILWAY JOURNAL* for Jan. 12, 1924, page 73. Mr. Henry pointed out that interurban railways must report to the Interstate Commerce Commission on accidents. They were included in a partial way under the federal legislation with respect to block signals, and they are affected by the hours of service act, the parcel post act, the general railway mail act, the safety appliance act, and the regulations for the transportation of explosives. All of these provisions, he said, are administered by the Interstate Commerce Commission.

On the Sec. 15-A matter, known as the recapture clause, Mr. Henry emphasized the necessity of each road appearing at the March 19 hearing and filing its own brief. He called attention to a brief prepared by Judge Bradley for the Chicago, North Shore & Milwaukee Railroad as a test case, which he said gives a very complete presentation of the electric railways' position.

The future of the electric railway industry from the viewpoint of an outsider was discussed by W. L. Taylor, prominent attorney of Indiana and vice-president of the Fort Wayne & Northwestern Railway Company. The awakening of the railroads to a realization that application of the police power largely annulled the protection afforded by franchises has resulted, Mr. Taylor stated, in an increasing conviction on the part of railway managements that service and rates are the primary factors which control railway success.

Summarizing the general status of the transportation industry, Mr. Taylor

sounded a note of optimism, and divided the situation into three general phases as follows: (1) The period of steam railway construction has been completed and very little additional mileage will be built in the future. (2) Very little electric main-line construction will be carried on, but roads now built will be extended and expanded. Electric railway business may be safely expected to expand materially as business and population continue to increase. (3) The interurban roads are gradually beginning to go after all kinds of business including not only freight but also electric light and power. With the passing of the small town electric plant, service should be taken from large central stations and transmitted over railway power lines to

the small communities along the rail routes.

A report of the committee on insurance was presented by F. D. Norviel, general passenger and freight agent, Union Traction Company of Indiana. It provides the basis for working out uniform practices for the insurance of equipment, to facilitate settlements for damages to cars on foreign roads. The report was accepted by the association and the committee continued.

At the dinner on Thursday night, former Governor Cox of Ohio was the guest of honor and speaker of the evening. Several reels of very interesting pictures depicting the latest developments in aircraft were shown at the dinner by special arrangement with the War Department.

ments whereby the transformer bank may be transferred from one line to another when desired. The low-voltage side should in all cases be supplied with an automatic circuit breaker. Any desired metering equipment should be provided either in a cabinet at the station or in the mine, mill, or factory building which is being supplied with power.

It is in the design of stations of the switching type that engineering problems are met. Many a station is designed which is cramped, prevents expansion and introduces unnecessary hazards, or on the other hand, the design may be too extravagant. Standardization of structures has been given much careful thought, but little progress has been made. Variations that enter into the design are those due to available space; topographic, climatic or geological conditions; capacity; voltage; strains due to incoming wires; type of equipment, and individual preferences of engineers.

In general these stations are built of steel and are of two main types, the fabricated or the heavy member type. Each has its advantages and disadvantages.

The fabricated type usually costs more per pound but its total weight can be made considerably less. It is stiffer and less liable to deformation if properly designed. Long spans are more practical, which is extremely important in considering high voltages. If the station's location is such as to require trucking at destination, the fabricated type bolted in the field is desirable because the component parts can be shipped in convenient sized bundles.

The heavy member type has the advantage of fewer pieces to handle and consequently greater ease in erection. Its cost will probably be greater, because the steel is not so advantageously used. It may introduce serious difficulties in handling at destination, particularly if a railroad siding is not adjacent to the substation site. The foundations are simpler as a rule with this type than with the fabricated type. The sag in horizontal members will, however, probably be greater and the spans are more limited in length.

Considerations in Design of Outdoor Substations*

By B. W. KERR

President Railway & Industrial Engineering Company, Greensburg, Pa.

OUTDOOR substations today are the recognized type, and only under exceptional circumstances, or to meet a very special requirement, is a transformer substation housed in a building of any kind. Rotating machinery, such as converters and regulators, requires a building or shelter, and the sensitive equipment of an automatic substation still more requires this protection from the elements.

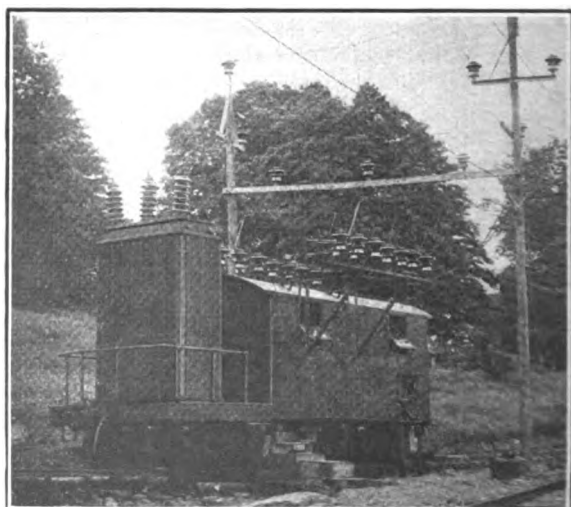
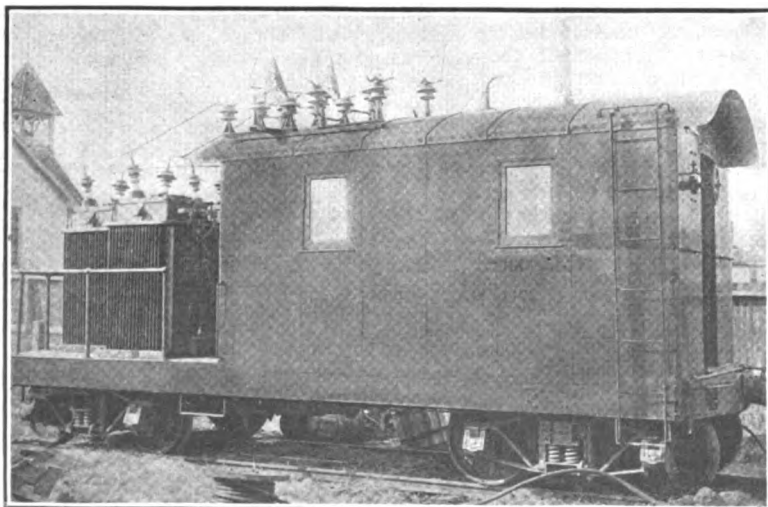
On the other hand, stationary transformers, oil circuit breakers, lightning arresters and apparatus of this type are sufficiently protected by their regular housings. The addition of a building doubles the hazard by carrying the conductors through the walls in addition to carrying them through the housing of the apparatus. The higher voltages also require such a spacing between conductors and to ground that the cost of a building would be prohibitive.

Outdoor substations can be divided into two general classes. The first, or

switching stations are those handling a multiplicity of incoming or outgoing lines together with one or more sets of transformers. The second are stations designed and intended for one specific predetermined load, such as a portable substation or one for a coal mine, and which probably do not require any arrangements or plans for expansion.

The particular purpose stations are as a rule simple and little need be said about them. Usually they consist of a transformer bank fed by one, or possibly two, incoming high-voltage lines. The high-voltage side is ordinarily protected by a lightning arrester and provided with the proper switching apparatus for disconnecting the transformers from the line. It also is desirable to provide an automatic means for opening the circuit and protecting the system in case of trouble in the transformer bank. This may consist of an automatic oil circuit breaker, an automatic air-break switch, or a combination of switch and fuse.

If more than one incoming line is used there must be switching arrange-



At Left, Portable Substation of the Public Utilities Company, Evansville, Ind., Showing Outdoor Equipment. At Right, a Portable Substation of the Scranton & Binghamton Traction Company, Showing Service Connections

Another phase to be given consideration is whether the station is to be galvanized or painted. If a station is to be galvanized there should be no riveted joints. The best practice demands that all pieces should be separate and bolted together. This makes the structure dependent for stiffness on the care exercised in drawing up these bolts.

Painted structures, on the other hand, lend themselves to shop riveting of trusses, gusset plates and the like. The variation in cost between a galvanized and painted structure for the steel alone will be in the neighborhood of 25 per cent.

Consideration must always be given to the location of the operating handles of the switching apparatus, and to the clearances required by interconnecting rods. Too frequently these are not considered until the design is complete or even until the station is built. The controls are always a divided responsibility unless the manufacturer is responsible for both steel structure and apparatus. He is under a severe handicap in furnishing controls to fit a structure designed by the power company unless he has full details of the steel. Even then it is necessary to furnish information to the fabricator regarding the various holes required to mount, not so much the apparatus itself, as the guide plates, bell cranks, and locking devices required for successful switch operation. If the station is to be galvanized no field drilling of members should be allowed.

Proper clearances between wires and to ground and the proper relative locations of the various circuits will serve greatly in protection of the station and system from disturbances.

My viewpoint, of course, in this discussion is that of the manufacturer, but of the manufacturer who keenly feels the needs of the operator. Too frequently the operator purchases his transformers, oil circuit breakers and the like, figuring they are the long delivery items, and postpones closing for the substation and outdoor switching apparatus until the last minute. The result is that not enough time is given to the problem thoroughly to digest it.

In erecting the air-break switching and protective apparatus, give the same careful supervision to it you would give to oil circuit breakers and indoor substation apparatus. Do not think that because it is outdoor apparatus it can be erected and adjusted by a lineman. Regardless of whose apparatus you buy, adjustments are necessary and a man to make these adjustments needs more qualifications than the ability to use a pair of spurs and change an insulator.

Keep in mind the final appearance of the completed station. In these days of customer stockholders, the properties are given a more careful scrutiny in passing. Neatness of wiring, symmetry of arrangement and maintenance of structure and grounds are essential in an outdoor substation, as it is open to public gaze. A good-looking building can house a multitude of sins, but a wire fence requires a clear conscience.

Possibility of Utilizing Grid Losses for Heating*

By D. D. EWING

Professor of Electric Railway Engineering,
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THE question of how to reduce the amount of electric energy consumed by car heaters has come to me a number of times within the past few years. By properly designing the heating system of the car, by proper heat insulation of the car body, by careful operation, and by the use of automatic heater control, we can avoid waste of energy in heating a car. With these items correctly taken care of, the only additional possibility of saving heating energy is in making use of energy that is now going to waste.

The most obvious source of waste energy is the grid resistance loss, and railway men have from time to time proposed using this energy for heating purposes. In looking over my files for these losses, however, I find very little information of value. In most cases where one finds anything at all the grid losses have been figured from typical speed-time curves, and while they are of some interest in indicating minimum limits they do not give as accurate a view of actual operating conditions as one might wish.

In most handbooks and railway treatises, the grid losses are taken into account by making an estimate of the average motor efficiency during the "notching up" portion of the acceleration period. In a theoretical analysis of the various losses occurring in car operation, M. V. Ayres, in the *ELECTRIC RAILWAY JOURNAL* for Aug. 21,

1909, estimated that the grid losses for a 41-ton interurban car amounted to 0.157 kw.-hr. per start. N. W. Storer, in the *ELECTRIC RAILWAY JOURNAL* for Feb. 6, 1915, says that in ordinary city service the rheostat losses range from "12 to 20 per cent of the total energy used."

Certainly the most exhaustive treatment of the subject that I was able to find in an extensive search through my technical information files is an article contained in the *ELECTRIC RAILWAY JOURNAL* for Aug. 17, 1918. In this article certain tests made on a wooden car, 47 ft. long by 8 ft. 7 in. wide, used in elevated service in New York, are described. The conclusions were that in this service the grids furnished about one-third of the heat necessary for the car.

The objections to the use of grids for heating may be briefly summarized:

1. The amount of heat available is not controllable, but depends on the service and efficiency of the motorman.
2. The heat is supplied intermittently.
3. The cost of making the grid loss energy available for heating is greater than the resulting saving in energy.

Relative to the first of these objections, it is of interest to note that the more efficient the motorman the lower will be the grid loss. The second objection indicates the need of an additional thermostatically controlled heating system. As to the third objection, it may be pointed out that in the modern safety car only one small grid bank is used. It would seem that by the proper location of this bank the heat generated in it might be made available inside of

*Abstract of paper presented before Central Electric Railway Association at Indianapolis, Jan. 24, 1924.

TABLE I—HEATING REQUIREMENTS OF ELECTRIC CARS

Length of Car, Feet	Heater Capacity, Kw.-Hr.	Kw.-Hr. per Car-Mile
20-28	5.5	0.55
28-34	7.5	0.75
34-40	10.5	1.05

TABLE II—GENERAL DATA ON CARS TESTED

Car Number	Car Type	Dimensions, Feet	Empty Weight, Tons	Number Motor	Type Motors
A	Safety	27x8x8	7.5	2	GE-264
B	Safety	27x8x8	7.6	2	GE-264
C	Safety	27x8x8	7.6	2	GE-264
D	Paye single truck	32x8x9	15	2	GE-216E
E	Interurban	.....	30	4	GE-93

TABLE III—GRID LOSSES IN PER CENT OF INPUT TO MOTOR CIRCUITS

Test Number	Car Number	Stops per Mile	Grid Loss in per Cent	Heater Input in per Cent of Motor Input
3	A	5.7	6.76	68.8
4	B	3.85	11.8	67.6
5	B	9.55	12.8	41.6
6	B	7.85	12.1	58.5
7	C	5.55	14.7	19.3
8	D	11.4	9.8	26.0
9	D	10.4	10.0	19.0
10	E	1.08	13.3	.....

TABLE IV—GRID LOSS AND ENERGY CONSUMPTION DATA

Test Number	Car Number	Stops per Mile	Schedule Speed M.p.H.	Input to Motors Kw.-Hr. per Car-Mile	Grid Loss per Car-Mile	Grid Loss per Start	Heater Input per Car-Mile
1	A	3.12	8.9	1.26	.....	.....	0.501
2	A	6.75	6.1	1.325	.....	.....	0.75
3	A	5.7	6.5	1.127	0.0762	0.0133	0.721
4	B	3.85	10.0	1.218	0.143	0.0371	0.731
5	B	9.55	9.45	1.928	0.247	0.0258	0.80
6	B	7.85	8.05	1.504	0.194	0.0247	0.94
7	C	5.55	7.8	4.62	0.678	0.122	0.89
8	D	11.4	7.89	2.00	0.197	0.0189	0.52
9	D	10.4	8.32	2.57	0.258	0.0248	0.49
10	E	1.08	29.4	2.12	0.282	0.261	.....

the car instead of being dissipated under the platform. It might also be mentioned that the grids commonly used are designed as railway grids always have been designed, viz., to run cool.

With the great improvements in resistor units for electric heaters now available, it seems that it might be possible to use much smaller resistors operating at high temperatures for grid resistances, particularly on the safety cars. Such grid banks would be much smaller even than those now used and would be much more efficient as heating units.

With the idea of getting some test data on grid losses, I started two or three years ago to measure the grid losses of all cars on which I had occasion to make energy consumption tests. These tests are briefly summarized in the accompanying tables.

DATA IN TABLES EXPLAINED

Some data relative to the heating requirements of cars are shown in Table I. The first two columns were abstracted from the American Handbook and the last column has been computed on the basis of a schedule speed of 10 m.p.h.

A common allowance for heating purposes is 4 or 5 watts per cubic foot of car body volume. Another common estimate is that ten persons will emit as much heat as a 1-kw. heater.

Table II sets forth some general data relative to the cars tested, while in Table III the grid and heater losses are expressed in percentages of the input to the motor circuits. The input to the motor circuits is the sum of the power actually used by the motors and the grid losses. It will be noted that the heaters require from two to ten times the energy lost in the grids.

Table IV sets forth the test data in greater detail. It will be noted that the grid loss per start ranges from 0.0133 kw.-hr. for one of the safety car tests to 0.261 kw.-hr. for the small interurban car. In passing, it is worth while to note the very high energy consumption of the safety car in Test No. 7. The brakes on this car had just been adjusted and it was found that they did not completely release. This test emphasizes the need of care in taking up brake rigging slack.

As the car in Test No. 3 carried only a few passengers and was run at low schedule speed, the figure 0.0133 kw.-hr. per start is very low. Tests 5 and 6 gave values more nearly in accord with what might be expected in ordinary service. In these two tests the grid loss ranges from one-fifth to about one-fourth of the heater energy.

If 0.2 kw.-hr. per car-mile be considered a fair average for grid losses on safety cars, on the basis of an average car operation of 100 miles per day and a heat requirement of 200 days per year, the grid energy loss would be 4,000 kw.-hr. At as low a figure as 2 cents per kilowatt-hour at the car this energy would amount to \$80 per season per car. This amount capitalized at 20 per cent is \$400, and is the amount that could be invested in the construction of devices which would enable the grid losses to be utilized. In this esti-

mate it is believed that the car-miles per day is conservatively low and that the depreciation allowed in the 20 per cent is ample.

It is probable that the investment necessary to utilize the grid losses would be less than \$100 per car and, therefore, it would seem that for single-truck safety cars grid loss utilization would be profitable. It should be pointed out, however, that thermostatic

control of heaters would be necessary if actual savings are to be realized. Even with thermostatic control there would be little saving in very severe weather, because at low temperatures the heater capacity in safety cars is such that the thermostats do not cut out the heater circuits. In mild weather, however, there would be some saving in energy and in severe weather the cars would be warmer.

Outlook for Interurbans Stated*

Many Difficulties Beseet Interurban Railways, but There Is Good Prospect for Their Future Success if Aggressive Management Provides Modern, Attractive Equipment and Then Sells the Service

BY THOMAS CONWAY, JR.

President Chicago, Aurora & Elgin Railroad and Professor of Finance, University of Pennsylvania

FROM a financial point of view, the interurban roads as a group are in a more critical situation than the city properties. Increased operating costs, coupled with the inroads which the private automobile and motorbus have made upon the traffic of the interurban lines, have undermined the credit of these carriers and threatened their ability to exist.

When we recall that a large proportion of the interurban mileage in this country was built before an opportunity had been afforded accurately to estimate the amount of business which could be commanded; when we remember that a large proportion of the interurban mileage was unable to earn a fair return on the capital invested even in pre-war and pre-automobile days; when we take into account the tremendous increase in the cost of labor and materials which has occurred in the last decade and give consideration to the reduction in business which the privately owned automobile and the motorbus have caused, we can readily understand why the interurban railways have come to such a grave pass and why many observers feel that a substantial part of the interurban mileage at present in operation will be junked during the next decade, unless the owners of the interurban properties and the public served bestir themselves to revamp the entire situation.

Prolonged and extended study of the interurban situation in various parts of the country, as the technical adviser of various bondholders' protective committees, has led me to the conclusion that there are three factors which, singly or together, will determine the future of most of our interurban lines.

The first factor is the extent to which public co-operation is afforded. Unfortunately in many localities the public had come to look upon the interurban as a source of great profit and in some instances as an engine for public exploitation. The events of the last few years have largely dispelled this delusion, especially where company officials have given proper attention to the matter of constructive publicity. If the interurban can survive during the period of time required to make the public under-

stand the economics of the situation, I am confident that the activities of the motorbus will be curbed so that instead of being instrumental in the destruction of the interurban, the motorbus will eventually serve as a valuable feeder or auxiliary.

The second factor in the problem concerns the willingness of the owners of our interurban properties to face the stern realities of the present situation. The rank and file of our interurban companies are operating heavy, expensive, antiquated equipment which was constructed in the era of imitation of the steam carriers. Unless a substantial proportion of our interurbans are willing to displace obsolete equipment, substituting therefor modern, economical, comfortable, attractive equipment, I am afraid that the mortality among interurban companies will be tremendous. There are many localities where the public would prefer the modern motorbus to the antiquated interurban car now in service. Protection from cut-throat motorbus competition can scarcely be secured and retained unless the interurban is willing to keep step with the march of progress and install modern equipment and in other ways improve the attractiveness of its service and secure every possible economy in operation.

The third factor in the equation concerns the willingness and ability of interurban properties to sell their service, thereby reattracting traffic which has been lost in the recent past and creating traffic which the interurban has never heretofore enjoyed. As Britton I. Budd, president American Electric Railway Association, has aptly said in a recent interview, the interurbans must "modernize and merchandise" if they are to succeed.

To my mind, the interurbans of the country divide themselves into three main groups, in so far as the problem of increasing traffic and reducing operating costs is concerned. The first group is made up of what I would term local interurban lines, which would include interurbans connecting some particular city with one or more smaller towns, and depending, to a large extent, upon the local business of the rural districts contiguous to the line. Obviously this group includes the major portion of the interurban proper-

*Abstract of paper presented before Central Electric Railway Association at Indianapolis, Jan. 24, 1924.

ties of the country. They are essentially local carriers. A number of such carriers within recent months have purchased lighter weight interurban cars for single-car operation, running them on a more frequent schedule. This has ordinarily reduced the ravages of bus-line competition and increased the volume of traffic.

The financial salvation of what I have termed local interurbans depends primarily upon the reduction of operating costs, making possible the operation of more frequent service, which in turn, under most conditions, will tend to increase the volume of business handled. On such properties there is not sufficient business to warrant the service already given, much less train operation.

In the second group of interurbans are those which by location and physical characteristics handle a large volume of through business between terminal cities of substantial size. The number of electric railway lines so situated is much smaller than the number of purely local interurbans. There are, however, a substantial number of properties which operate between cities of approximately 100,000 population or more, sufficiently near each other to engender a substantial amount of intercity business. A large percentage of the interurbans of this type are handicapped by physical defects which in some cases are so serious as to render abortive the efforts of the management to command a substantial volume of through business.

In my judgment, the traffic of the through interurban lines connecting cities of substantial size could be much increased in most cases if it were possible to operate still faster schedules than those which now prevail. The American public puts a premium upon speed. The automobile has raised the requirements of the public as regards speed. Where the characteristics of the interurban are such that it is possible to make a journey in the same or less time by automobile, the interurban is, in most cases, doomed to extinction. Where, on the other hand, the physical characteristics of the interurban are such that it can make the run between the terminal cities in substantially less time than it is possible so to do with an automobile, the interurban is strongly entrenched and will suffer much less from the effects of private automobiles than would be the case under other circumstances. Other things being equal, the public will patronize the carrier making the fastest time without incurring unusual accident hazards.

The premium which the public puts upon speed is clearly evidenced by the recent tendencies in the steam railroad field. A few years ago, the number of extra fare trains was comparatively small and they handled but a fraction of the total long distance business. At the present time, the major part of the through business is handled upon extra fare trains. The public will willingly pay a dollar an hour to reduce the tedium of the journey and to enjoy the comforts and conveniences afforded on extra fare trains. While extra fare trains are out of the question on practically all of our interurbans, the lesson which is so clearly contained in the re-

cent tendencies of steam railroad travel should not be lost upon us.

If an interurban line is built upon private right of way, so that the ever growing volume of vehicular traffic along the main highways will not force a slowing down of schedules for through trains, it will follow that the advantage of the interurban as compared with the motor bus will, in most cases, steadily increase as time goes on. The rapid increase in the number of automobiles upon our main highways is slowing down the speed which the automobile driver can safely make along such highways. This will inevitably mean that the running time between terminals of motorbus routes connecting important centers of population will steadily increase to the direct advantage of the fortunately situated interurban line. Under present conditions it is impossible with safety to make an average speed of much over 30 miles per hour upon congested main highways such as connect large centers of population within 30 to 50 miles of each other. If the interurban line can safely make a schedule of 40 miles or more per hour outside the limits of built-up city areas, it enjoys a great advantage over the motorbus.

I am satisfied that a careful study of the possibilities of many through interurban lines connecting important terminal cities will show that their owners could profitably modernize these properties by a progressive series of steps involving the relocation of portions of the trackage necessary to attain the required schedule speed, and by purchasing modern equipment, in the design of which satisfactory riding qualities, comfort and attractive appearance are not sacrificed to the current fetish of extreme lightness in weight. Indeed I believe that many of the interurban lines of the type just described, which are now making very unsatisfactory financial showings could be turned into dividend payers within a reasonable period of time if the means could be found to modernize the properties and if the extent of such modernization is not so great as to involve the practical reconstruction of a large part of the property.

The factor of good entrances into terminal cities is a most important element of the problem. Increasing street congestion is most serious to the interurban line, for it increases the time required to enter terminal cities. This is so serious a handicap in many cases as to preclude the effective development of a large volume of through intercity business. The street congestion in many cities, however, has become, or will shortly become, so serious that I think it is entirely probable that the next decade will see the construction of subway lines in the central business districts of many of our larger cities, which may be used alike by surface and interurban cars.

The third group of interurbans, to my mind, are those properties whose physical characteristics pertain partly to each of the two groups previously described. Such properties really have two classes of business. Under most conditions it is idle to endeavor to design equipment which would be satisfactory in both classes of service.

Equipment designed for high speed through service must necessarily be heavy and with a high gear ratio, which makes it uneconomical in local service. With two distinct classes of business, the proper policy is to have two distinct classes of equipment, each suitable for the type of service in which it is used.

In conclusion, it seems to me that the lesson of the immediate past is the necessity for a careful study of each situation rather than the application of general formulae to all properties regardless of whether or not they may fit. To stand still is to invite almost certain defeat. The investment of new capital should be contemplated only after a most thorough study of the entire problem. In many cases the situation is such that the investment of any substantial amount of capital could not be recommended by prudent men, but generally the road to success clearly lies in modernizing the properties and merchandising their service, without which the present investment is of little present or potential value.

Electric Railways Should Operate Trucks*

BY F. W. WATTS
General Express Agent,
New York State Railways, Utica

THE time has passed when we can ignore the existence of unregulated motor trucks and their disastrous effect on our express and freight business. We must take active and immediate steps to combat this unfair competition.

During the past ten years the territory served by the express department of the New York State Railways, situated in the Mohawk Valley from Syracuse to Little Falls, has had a gratifying growth in population, industry and wealth, but the revenue and tonnage of our express and freight business has not kept pace with this growth. Only by rigid economies in operation and an express service at fair rates have we been able to hold our own, and many months have shown an actual loss over the year before. In the face of such conditions can we view unregulated motor trucks with anything but alarm?

On the one hand is the street railway company subject to the provisions of its franchise, to the rules and regulations of the public service commissions, paying in many instances enormous municipal, state and federal taxes, filing copies of tariffs subject to the approval of the commission, responsible for damage and losses, maintaining a uniform and punctual service, as efficient in torrid August as in the snows of January.

On the other hand is the unregulated motor truck engaged in transportation work. Its owner is hampered by nothing save traffic regulations. His rates are on one scale today, another tomorrow, if, indeed, there is any assurance that he will be on hand tomorrow. If

*Abstract of a paper presented at the Midwinter Meeting of New York Electric Railway Association, New York, Jan. 24, 1924.

the roads are impassable by mud or snows the business is left for the electric line, throwing a peak load for a few months of the year on a force and equipment adequate for only half the tonnage. If the consignee is located in a remote part of the village or city, perhaps on a hill entailing a long, hard trip for the truck, the operator decides he does not want the business, and it is left for the electric. It may be that the electric does not want it either, but under its regulations it is compelled to accept all business.

The truck operator may claim to be responsible for losses and damage to goods in transit, but the actual process of collection from him for such items is a difficult and often impossible task. Often he has no fixed headquarters and no permanent records, but cruises about like a taxi driver competing with others of his kind for enough freight to fill his load. Instead of regulating his rates to insure a profit, he is likely to run his truck at a loss, resulting in bankruptcy and a trail of debts. Then another, carried away by the truck salesman's tale of big profits, takes his place. There is also the unscrupulous free lance who charges exorbitant rates for small packages and fills the rest of his load with freight at less than steam railway rates.

There is a brighter side to this motor truck business in the case of the operators, unhappily few, who conduct their business with fair rates, adequate service and equipment and ample responsibility. They perform a genuine service to the business community and demonstrate in themselves that the motor truck business can be conducted along ethical and profitable lines.

STORE DOOR DELIVERY DESIRED

A survey of the wholesale houses, manufacturers and other large shippers brings out the fact that these shippers much prefer to handle their express and freight by the electric railway carriers, but since the consignees pay the freight, they have the privilege of choosing the medium of transportation. These consignees, small merchants and manufacturers, usually specify the truck, because of the store door delivery, cheap rates and the daily solicitation of the truck drivers.

To meet this demand, the electric railways should be prepared to supplement their present service with trucks, and if they do so they should be willing to submit to reasonable regulations by the Public Service Commission, since naturally our competitors would be subject to the same restrictions and rules. We are confident on this basis we can get the lion's share of this business that now escapes us. This is no counsel of despair or a last resort. It is a common sense recognition of a situation that has got beyond the discussion stage and demands action.

The entrance of electric railways into the general trucking business will undoubtedly precipitate a demand for regulation by the commissions. In other words, we will use these unscrupulous

competitors to bring about the result we desire, and when regulation does come, we shall be so firmly entrenched in our territory that the regulations will only the more solidify our position.

It is an old military axiom, "The best defense is an attack." I cannot but believe that carrying this war into the enemy's territory will eventually result in the recapture of this great and growing business.

Determining Service from Daily Operating Statistics*

BY A. L. HODGES

Assistant Secretary and Assistant Treasurer.
Brooklyn City Railroad

IN NO city, whether it be Brooklyn, Oshkosh or Kalamazoo, is the riding habit of railway patrons constant from day to day. There is a fluctuation, which it is the manager's duty to anticipate.

We must endeavor to outguess our patrons because there is not one of them who tell us when he is taking his family to the theater or when his club is going to a prize fight and that they will go and return at definite times and on certain lines. No indeed, they expect to go and come as they choose and demand that the service be there for them. And there is no "ready to serve" charge in the railway business either.

In order to keep thoroughly posted as to the riding habits of our customers in Brooklyn, we have adopted methods of keeping daily, monthly and periodic checks of earnings, costs, mileage and passengers carried. Each night, shortly after midnight, the night depot master checks up his conductor's run lists for every line, striking a total of the receipts reported by individual conductors. He also totals the time-table costs for each line operating from his depot, taking into consideration overtime and other changes.

These cost figures the depot master enters in his log book together with the explanation for the increase or decrease. He then telephones the figures to headquarters, where they are entered on a printed form showing lines, revenue and time-table costs for each, a total of sixty-seven lines from our thirteen depots. Several copies of this tabulation are made and are on the desks of each operating official for his perusal when he arrives at the office the following morning.

The figures arriving in our general manager's office are immediately entered on graphic charts which show the daily performance of each line for the current month. At the end of each fifteen-day period an operating ratio is determined by averaging the daily proportion of time-table costs to receipts and this fifteen-day ratio is also shown on this chart.

The preliminary figures from which

*Abstract of a paper presented at the Midwinter Meeting of the New York Electric Railway Association, New York, Jan. 24, 1924.

these charts are made are also kept in cumulative form so that immediately after the close of each month we have the total monthly receipts, time-table cost and mileage. This enables us to secure a preliminary "receipts per car mile." In checking these figures with the accounting department's final figures we have found them to be within $\frac{1}{2}$ to 1 per cent correct, so we have no hesitancy in using them for a basis of traffic study.

A careful study of the charts, comparing them with the previous month's charts, as well as those for the same month of the previous year, enables the manager to order an increase or decrease in service to fit conditions as determined. This has been the means of saving many thousands of dollars. An increase in service is ordered when it is shown that a steady increase in riding is not being properly taken care of. Temporary changes are made by patching the operating schedule and can usually be placed in effect one or two days after the discrepancy is noted by the manager.

In the event that these preliminary changes do not correct the service requirements and the line continues to fall off or build up to an unexplained degree we immediately call for what we term a "cross-section check." This check is taken by men trained in traffic counting. If a line is forty-five minutes long, that is the running time between terminals, we station several men along this route about equal distances from each other. These men keep a record of each car passing them in each direction and the number of passengers on the car. Such checks are made in eighteen-hour periods, checkers working in two shifts of nine hours each. The records come in to headquarters and are tabulated in fifteen-minute periods and the tabulation from each checking point is totalled. This automatically determines the maximum loading point, as well as the falling off in the number of passengers to be handled at the other checking points. The information is then plotted on a curve to indicate the heaviest point of riding, in each direction, as well as the relationship of the other points checked to this maximum point.

It would indeed be folly for a railroad manager to attempt to run 100 per cent service from one end of a line to the other when checks plainly show that the patronage builds up from 20 per cent at one terminal and from approximately 25 per cent at the other terminal. Some of the longer lines in Brooklyn have six and eight cut-back or short-line points, showing to what extent we have gone in taking care of our "short rider."

Traffic studies are taken on each line on an average of once in ninety days and careful consideration is given them by the management to determine just how the service as furnished fits each line. [See ELECTRIC RAILWAY JOURNAL, Dec. 30, 1922, page 1001, for complete details of these traffic methods.]

National Safety Council and Safety Engineers Meet

JOINT sessions of the engineering section of the National Safety Council and the American Society of Safety Engineers were held in the Engineering Societies Building in New York City on Jan. 22. The general topic for the morning session was handling material, and for the afternoon session welding and cutting. Some of the points brought out in regard to safeguarding welding and cutting operations are of interest to electric railway men.

A consolidation of the American Society of Safety Engineers and the Engineering Section of the National Safety Council to be known as "The American Society of Safety Engineers, the Engineering Section of the National Safety Council," was announced at the banquet following the joint conference of the two organizations.

A paper on safety in electric welding and cutting presented by D. H. Deyoe of the General Electric Company emphasized the necessity for taking precautions for the protection of the operator and those working near him in electric welding and cutting operations. Mr. Deyoe classified these precautions as follows:

1. Protection of operator's eyes from the dangerous rays of the arc.
2. Protection of operator's body from sunburns caused by the dangerous rays of the arc.
3. Protection of operator's body against burns from hot metal.
4. Safeguarding the health of the operator.
5. Protection of others working in close proximity to welder.
6. Protection of operator from electric shock.
7. Fire hazards.
8. Protection of welding apparatus and its control.

The electric arc passing between iron electrodes is rich in visible and ultra-violet radiation, and the amount of energy consumed in the arc makes the total energy radiation more than the eye can safely bear at working distances. The intense glare given off from the arc contains all of these rays and the operator has to be protected against their harmful effects. For light welding, face shields containing light colored protective glass may be safely used, or in some cases goggles alone, fitted with similar glass. For heavy electric welding or carbon cutting, the operator's eyes should be protected, either with a welding helmet or with a face shield, these to be provided with a darker shade of protective glass selected to suit the welder.

Welders' lenses should be carefully selected. Lenses that transmit only bands of color, separated by dark absorption bands, are undesirable, being likely to produce eyestrain. The transmission spectrum should be continuous, as shown in that of Noviweld. It

should not extend too far either into the red or the green, and it should absolutely cut out all blue and violet light.

All exposed parts of the body are subject to a burning effect from the rays of the arc. This burning is similar to sunburn. If the body is not protected by covering of some kind, it will cause the operator more or less discomfort or pain. For ordinary welding the welder's body is usually covered by close woven clothing and the hands by leather gloves. In heavy arc and carbon welding and carbon cutting where currents of 200 to 1,000 amp. are used, it is necessary to protect the operator still further. With these heavy currents the arc rays will penetrate the ordinary clothing and it is customary for the operator to wear a large well fitting leather or asbestos apron, protecting as much of his body as possible.

PROTECTING OPERATOR AGAINST HOT METAL

The greatest danger of injury to the operator comes from hot metal burns. These burns may come from either the operator picking up hot parts just welded or from flying particles of molten metal lodging in some part of his clothing or more often in the tops of his shoes. The necessary protection against such trouble is heavy leather gloves and protectors to be placed above the tops of his shoes to prevent molten metal from lodging there.

When using the arc for heavy welding or cutting, or where welding or cutting is being done on non-ferrous metals or galvanized materials, or materials that are oily, it is very desirable to provide ventilating ducts or fans to carry away the smoke and more or less poisonous fumes. If the operator is allowed to inhale these, his health will sooner or later be impaired.

To protect near-by workers from eye flashes, opaque screens should be placed between the welder and the workman. Or a better arrangement would be to enclose the welder in a welder's booth shutting off all the flashes from the surrounding part of the factory. It is desirable to paint the side walls and all apparatus in a welding booth or a small room used for welding with a paint that will absorb the dangerous rays of the arc. A satisfactory paint for this purpose may be made from zinc oxide or Chinese white mixed with glue water. This will dry with a smooth unglazed surface.

Another paper on safety in gas welding and cutting was presented by H. S. Smith of the Union Carbide & Carbon Corporation, New York, N. Y. He said that the greatest trouble comes from unskilled welders, and that proper training should receive more attention.

Mr. Smith gave several examples of accidents which had happened through

unfamiliarity of those having charge of the welding equipment with its construction and operation. Cylinders of gas and oxygen have been stored out of doors in unprotected places where freezing of the cylinder valves has resulted. Mr. Smith told of accidents that have happened as a result of trying to thaw out the cylinder valve with hot water or by using a blow torch. As the fusible plugs with which these valves are equipped melt at a temperature of boiling water, such practices should never be attempted. Mr. Smith emphasized the necessity of storing gas tanks in places where there is no danger of sparks from electrical apparatus. Accidents have happened from sparking of telephone connections.

Repairs to gas welding equipment should be done only by men experienced in this work and pressure gages should be tested periodically to make certain that they are registering properly. A considerable part of Mr. Smith's paper was devoted to safety cautions that should be taken in the installation of gas generating equipment.

VALUE OF PROPER LIGHTING FACILITIES IN SHOPS

In a paper on "Glare," Charles Sheard of the research laboratories of the American Optical Company, Southbridge, Mass., emphasized the value of proper lighting facilities in shops. He said that the system of illumination used should not only give the workman proper light at his work but should be also combined with a general system of illumination which would avoid a contrast in light whenever the workman looks up from work.

P. R.R. Will Exhibit Locomotives

THE Pennsylvania Railroad has arranged a transportation exhibit for the period of the A.I.E.E. Midwinter Convention at Philadelphia, Feb. 4-8, at Thirty-second Street and Lancaster Avenue, adjacent to the West Philadelphia station. The exhibit will include the most powerful freight locomotive in the world, the "FF1" electric, the new "L-5" electric locomotive and one of the newest multiple-unit cars.

The "FF1" electric locomotive was equipped by the Westinghouse Electric & Manufacturing Company for experimental freight service. It is of the split-phase type with a continuous rating of 4,000 hp.

The new 200-ton single-phase locomotive, known as the "L-5," also equipped by the Westinghouse company, was described in detail in this paper, issue of Jan. 26. It is designed for preference freight service, but is now equipped with passenger gearing, giving a speed of 70 m.p.h.

The multiple-unit car is the type now in service on the Philadelphia-Paoli electrification. These cars, equipped with single-phase series repulsion type motors, now handle 23.7 per cent of the 77,246 passengers handled in and out of the Broad Street Station daily.

Maintenance of Equipment

Straightener for Damaged Steel Cars

By P. V. C. SEE

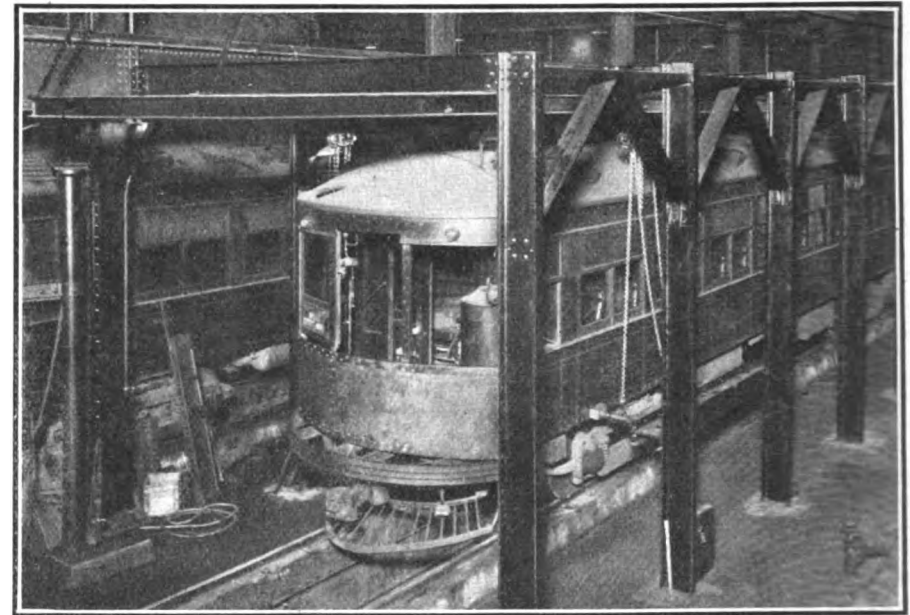
Superintendent of Equipment Northern Ohio Traction & Light Company, Akron, Ohio.

WITH the advent of the steel car it was soon found necessary to change the method of repairing wrecked cars, which in the case of a wooden car was to remove the broken material, either renew or splice out the broken sills and posts and then build up with new material. If the parts of a steel car were taken off and carried to the blacksmith shop and straightened and torn parts of the metal welded, the repaired pieces would not fit back in the car properly and the rivet holes never would match up.

A better method developed is to straighten the car without dismantling it. In straightening up a badly damaged car, it is often necessary to make two or three days preparation before the actual straightening is done. Jacks should be placed in their proper positions and turnbuckles at other points, preparations being made to apply the heat simultaneously often at six or eight places throughout the car. This heat is sometimes applied by big oil burners, gas torches, red-hot iron plates and, of late, the acetylene torch. The men doing this work have to be carefully instructed and drilled so that all heats and strains will be applied at the proper rate and time.

The actual straightening of such a car is usually accomplished in a very few minutes, although, as previously stated, the preparation may require several days.

After the car is straightened, if any of the parts have become torn or are too badly bent, they usually can



A Car in Position in the Straightener, Showing Application of Movable Beams

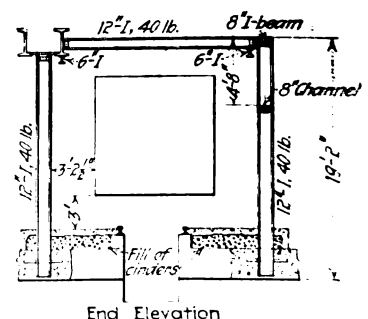
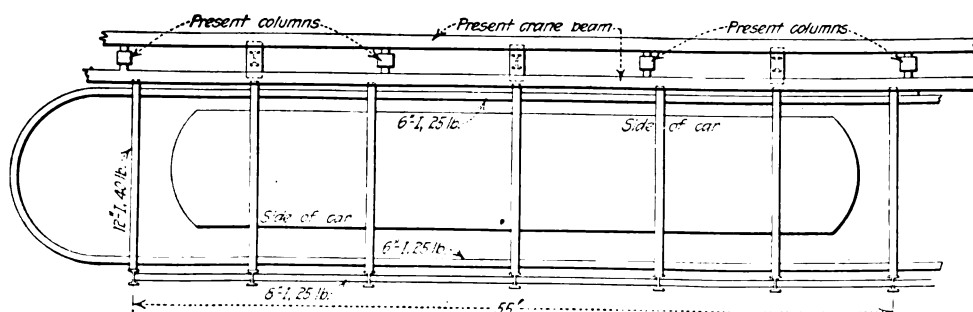
be welded up on the car, or, as a last resort, renewed.

In most shops the difficulty is to find a place where the rigging up for this work can be done. Usually one wall of a building will do for one side, but a shop rarely has at hand facilities for applying strains on both sides of the car. Therefore, most of the larger railway shops have designed some form of car straightener.

As the Northern Ohio Traction & Light Company had acquired a large portion of steel equipment, a study was made of the various car straighteners and plans drawn up for a framework that would cover the largest interurban car and enable the application of strain, either in compression or tension, at any point on the car. This apparatus is used a small portion of the time, so it is very desirable that it shall take

up as little valuable space as possible.

The steel columns of the building were used to form one side of the device. Between each two of these columns an intermediate column was erected so as to make the spacing short enough to give the desired strength. On the opposite side of the track, in line with each of these columns, was placed a column, there being a total of seven columns in each row. These were formed by 12-in. I-beams, while longitudinally they were connected at the top with 8-in. I beams, and 4 ft. 8 inches from the top a row of 8-in. channels were run so as to prevent any possibility of end strains throwing the apparatus out of line. A 6-in. I beam was hung longitudinally from the top cross-members so as to make a track for the chain block carriers used in handling the movable beams against



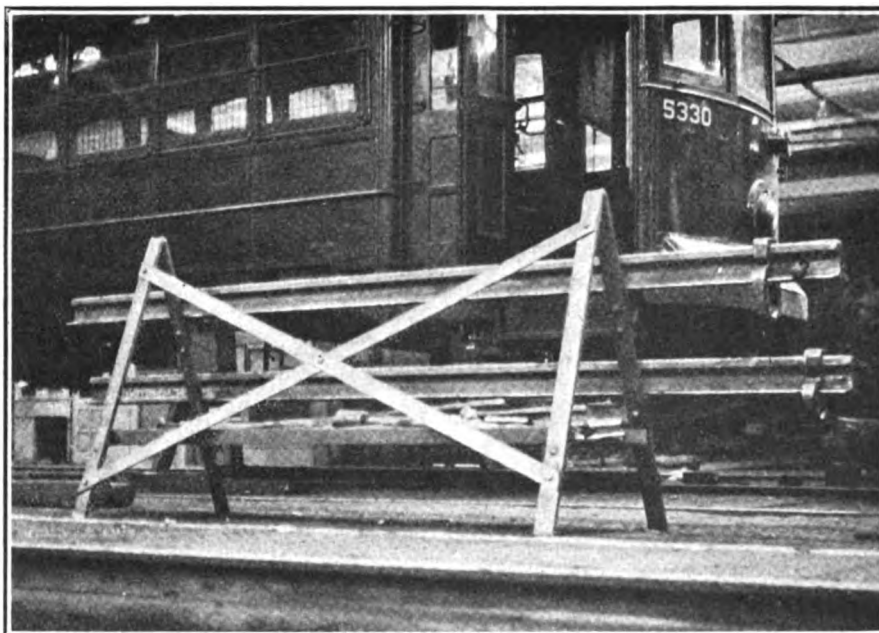
Details of Construction of the Northern Ohio Car Straightener

which the pressing or pulling is done. These movable beams were of a 12-in. I beam with 10-in. channels riveted at the top and bottom, thus forming a very rigid girder. When this device is not in use, no floor space is taken up excepting for the bases of the vertical columns. This space can be used, therefore, for the ordinary car repair. The photograph shows position of a bent car in the device, and the details of construction are shown in the drawing.

Crane Car Breaks Up Conduit Track

THE Washington Railway & Electric Company, Washington, D. C., which uses the underground conduit system, has been doing considerable track rehabilitation recently. In ripping out the conduit, which is constructed with heavy cast-iron yokes incased in concrete, the company has been using a Brownhoist crane car with very considerable economy.

The first operation in dismantling this construction, after removal of the paving, is to take out the slot rails, which are midway between the two running rails. Following this the running rails are taken out a section at a time, the crane car being moved along to uncover the track to be removed. The crane car then hooks on to the yokes so as to pull them out. As they are imbedded in the concrete, the action of raising these with the crane loosens the concrete to such an extent that it can be broken up readily and lifted from the trench by the crane so as to load it upon trucks for carting away. The crane car is thus used to break up



Rack for Small Tools Used by the United Railways & Electric Company of Baltimore

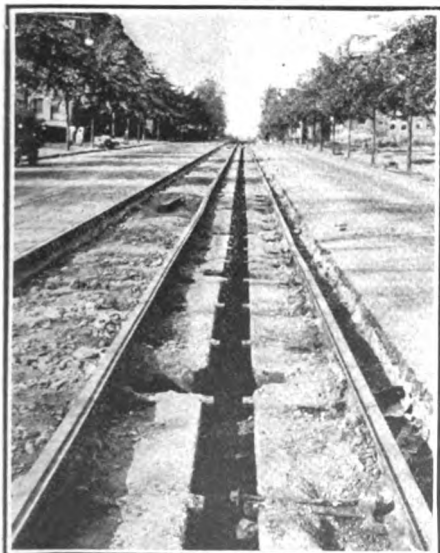
the concrete as well as to load it, and all heavy labor of lifting is done by the car. In addition to saving labor, this method also is very rapid. The concrete construction is readily taken out and repairs and reconstruction can be started without delay.

Convenient Rack for Shop Tools

THE problem of keeping various hand tools from becoming scattered over the shop floor, and at the same time providing so that they can be conveniently found when required, has been solved by the United Railways & Electric Company, Baltimore, Md., with a home-made tool rack which is supplied to the overhauling gangs. The accompanying illustra-

tion shows such a rack placed alongside one of the shop pits. In addition to having a long pan for carrying heavy tools, wrenches, hammers, etc., brackets are provided on the sides for two lengths of rail. These are placed underneath the car bodies to support them while they are being raised.

The rack is made of flat iron bars, the ends being of an inverted V-shape, thus serving as legs and supporting the rack. The two ends are joined together by diagonal braces. The tray for holding the tools extends the length of the rack, separating the two legs at each end and acting as an additional brace. This tray is raised from the floor approximately 12 in. The entire framework is riveted together, forming a very substantial construction.



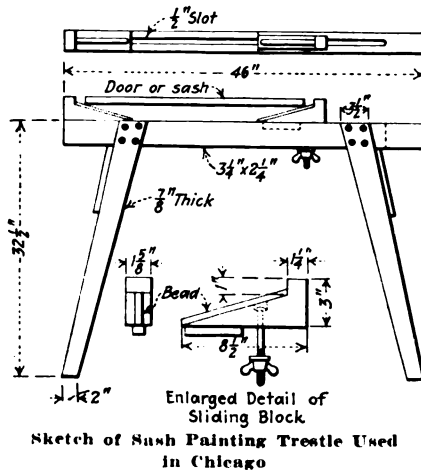
At Left, the First Stage of Track Reconstruction Consists of Stripping Out the Slot Rails. At Right, Lifting Broken Chunks of Concrete Onto Trucks for Hauling Away

Adjustable Painting Trestle

A HANDY trestle for supporting doors and sash while they are being painted or varnished is used by the shops and equipment department of the Chicago Surface Lines.

During the normal course of overhaul or repair of various types of cars the run of sash and doors that must be handled by the paint department are of several different sizes. The work is therefore facilitated by the type of painting trestle shown in the accompanying sketch.

The door or sash is supported on thin beads tacked to the faces of a



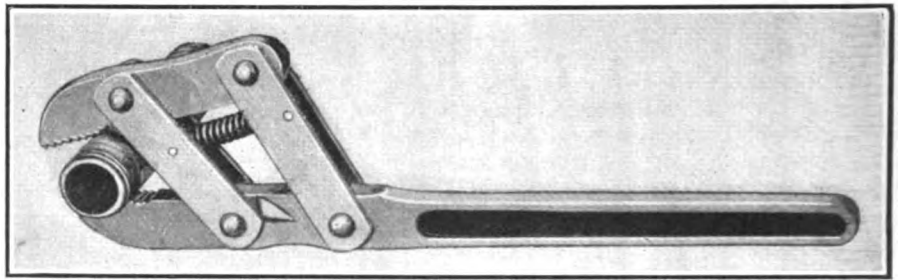
pair of tapered blocks. One of these blocks is fastened permanently at one end of the trestle while the other is arranged to slide back and forth along the trestle top bar. A bolt attached to the movable block passes through a slot in the top bar so that the block may be fastened in any desired position with a thumb nut underneath.

By this arrangement the blocks can be quickly adjusted for sash of different sizes and the trestle provides a secure support during the painting operation.

New Equipment Available

Self-Adjusting Wrench

A NEW type of wrench which differs quite radically from other adjustable wrenches now on the market is being introduced by the Greater Service Electric Company, Newark, N. J., under the trade name of "Robert." Its construction makes unnecessary the usual hand-screwing adjustment to make it fit various size nuts. The design pro-



Special Toggle Tight Grip Wrench

vides a firm grip without danger of the wrench slipping. The various parts are strong and are so proportioned that the wrench is easy to handle. The handle and jaw are drop forged from high carbon steel. Springs of a special construction, made by the Charles Fisher Spring Company, are used in the wrench. The 12-in. size shown in the accompanying illustration will handle any shaped nut, pipe or other articles up to 1 in. diameter.

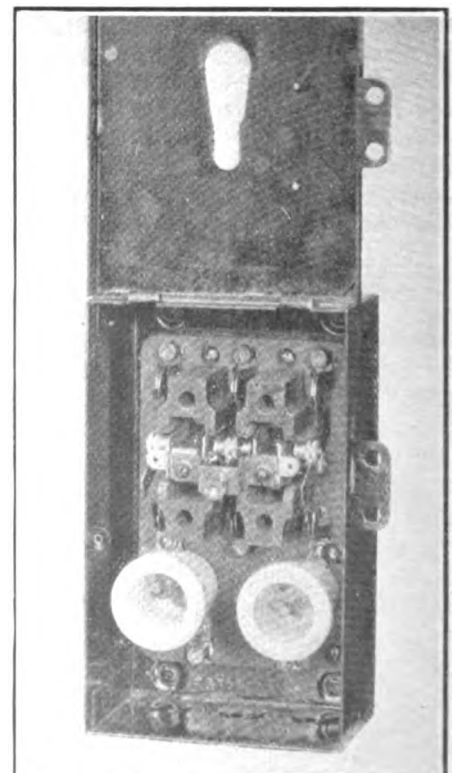
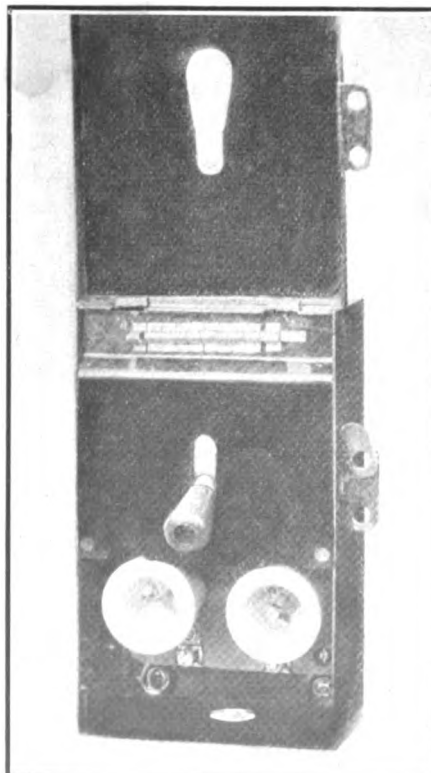
Starting Switch for Small A. C. Shop Motors

A NEW single-throw starting switch, the CR-1038-A1, has been put on the market by the General Electric Company for use with small alternating-current motors. This switch is of the three-pole type, designed for quick "make and break," and is operated by an up-

and-down movement of the handle. The unit permits of wall or pedestal mounting.

Overload protection is provided by means of two thermal cutouts, one connected in each of two legs of the motor circuit, in order to protect all phases of the motor against unbalanced and single-phase overloads, as well as overloads distributed over all phases. These thermal cutouts have an inverse-time characteristic and sufficient thermal capacity to permit the motor to operate at all overloads of short duration that are not objectionable from the standpoint of overheating the motor.

A new feature in the design of these cutouts is the elimination of the old screw base, two screws being used to fasten the cutout in place, the screws being readily loosened to remove the device if necessary. The fusible links may be removed without removing the cutout.



Motor Starting Switch. At Left, Cover Open and Shield Closed. At Right, Both Cover and Shield Open

The News of the Industry

Must Resume Railway Operation

Service "Just as Good" Idea at Spartanburg Is Condemned by the Supreme Court

As briefly stated in the *ELECTRIC RAILWAY JOURNAL*, issue of Jan. 19, the city of Spartanburg won a victory over the South Carolina Gas & Electric Company in a recent decision handed down by the South Carolina Supreme Court, granting the city the mandamus petition to require the railway to "re-store its lines and operate the same according to law."

The controversy in Spartanburg dates back to December, 1922, when the company abandoned operation of its railway. The mandamus petition was argued before the Supreme Court in Columbia on Oct. 8. The recent decision is the result of this hearing.

The opinion upholds the contention of the city that the franchise of the company to operate cars was a contract which the South Carolina Railroad Commission had no authority to abrogate. Discussing the contention that buses were substituted for street cars, the court held that no agency of the state could substitute something "just as good" for a specific service named in a contract "even if it is just as good."

Referring to the power delegated by the Legislature to the State Railroad Commission to "regulate, supervise and control" the public utilities of the state, the court ruled that that could only refer to a going concern; that it did not in any way pretend to give the commission the power to annul or destroy the operation of public utilities; that Legislature did not pretend to give to the commission or to the courts, the power to destroy or impair the obligations of a contract.

In expressing its opinion on the contention of the company that there was a demand for electricity and gas and no demand for railway service except by 3 per cent of the people, the court reminded the company that the gas, the electric light and power and the railway business stood or fell as a unit under the company's franchise contract.

The court was divided on the matter. One of the justices held that the commission did have the authority to order the discontinuance of the railway and that to compel the operation of the lines at a loss would violate the Fourteenth Amendment. Justice Marion in his dissenting opinion held that the

contract between the city and the company was made subject to the reserved police power of the state, and within that power could be changed by the state without impairing the obligation of the contract.

Wage Issue in Worcester and Springfield Still in Abeyance

Although the employees of the Worcester Consolidated Street Railway and the Springfield Street Railway in Worcester and Springfield, Mass., have agreed with company officials to arbitrate issues for the new contract the matter is still held up owing to the

failure of Attorney Warren, representing the companies, and Attorney Vahey, representing the union employees, to find the time to confer on the matter of selecting a third arbitrator.

The decision to arbitrate was reached after company officials and committees representing the union had held several conferences in an effort to reach an agreement. The union representatives would not change their demand for an eight-hour day and increased wages. Clark V. Wood, president, told the men the railway could not meet the demands as to do so would add to the annual payroll approximately \$750,000, an amount that even an increase in fares could not be expected to produce.

More Ride in Winter in New York

Up-State Commission Shows Heaviest Travel to Be During the Winter Months—\$5,500,000 Deficit Reported for the Railways in New York Outside of New York City—\$1,770,977 Paid in Dividends in 1922

OPERATING revenues of electric railroads in New York State outside of New York City for 1922 show a decrease of approximately \$1,000,000 below those for 1921, with an offsetting decrease in operating expenses of slightly more than \$300,000, thus resulting in a small increase in the operating ratio. For the fifth consecutive year this group of companies has failed

of automobiles has increased to such an extent that the operation of electric railroads is seriously affected. A further study of the operation of electric railroads shows that the heaviest travel is during the winter months when many automobiles are in storage.

On the matter of fares the commission included in its report the accompanying summary:

STATEMENT SHOWING RATES OF FARE IN EFFECT IN NEW YORK STATE

Item	1919		1920		1921		1922		1923	
	Cities	Per Cent of Total	Cities	Per Cent of Total	Cities	Per Cent of Total	Cities	Per Cent of Total	Cities	Per Cent of Total
5 cents....	26	46	19	33	16	28	15	26	13	23
6 cents....	23	39	5	8	9	16	5	8	4	7
7 cents....	6	11	24	43	16	28	24	43	27	47
8 cents....	2	4	9	16	16	28	13	23	13	23
Total....	57	100	57	100	57	100	57	100	57	100

to have a gross income sufficient to meet fixed charges, and for 1922 the deficit was approximately \$5,500,000. Of the entire group only twelve companies declared dividends in 1922, amounting to \$1,770,977, and four of these operated lighting departments.

These facts are contained in the report of the Public Service Commission presented to the Legislature on Jan. 15. The commission says that it is significant that the reduction in the number of passengers carried still continues. The number of passengers carried in 1922 was 599,080,364 as compared with 643,870,858 in 1921 and 743,233,247 in 1920, while the number of revenue car miles was 92,481,319 in 1922 as compared with 91,059,219 in 1921. One explanation of this situation offered by the commission is that the private use

An investigation was made of the "unlimited ride, transferable weekly pass." This form of fare is used in thirty cities and with few exceptions a noticeable increase in revenue followed its introduction. The commission says that it would seem that if the price of the pass is fixed after competent analysis there should be no reason why its use would cause any difficulty. It is impossible to take more than two rush hour rides a day and it is good business to give to the twice-a-day rider a concession that really applies only to non-rush hour riding when vacant seats are usually available. The "weekly pass" is now used in New York State in the village of Peekskill and in the cities of Olean and Salamanca. Besides being used in the cities, the Olean, Bradford & Salamanca

**RESULTS OF OPERATION OF ELECTRIC RAILWAYS OUTSIDE OF NEW YORK CITY
AS REPORTED BY THE PUBLIC SERVICE COMMISSION**

	1920	1921	1922
Railway operating revenues.....	\$47,059,281	\$42,824,208	\$41,858,280
Railway operating expenses.....	39,483,189	37,290,565	36,978,228
Net revenue railway operations.....	\$7,576,098	\$5,533,646	\$4,880,052
Railway tax accruals.....	2,668,731	2,779,829	2,872,018
Railway operating income.....	\$4,907,362	\$2,753,813	\$2,008,034
Net revenue, other operations.....	824,809	817,335	1,302,688
Non-operating income.....	968,531	1,086,074	924,942
Gross income.....	\$6,700,707	\$4,657,220	\$4,235,664
Interest charges.....	8,943,678	8,548,575	9,034,475
Other deductions from gross income.....	636,614	642,060	694,362
Net income.....	Loss \$2,879,590	Loss \$4,533,411	Loss \$5,493,173
Dividends during year.....	305,719	419,659	1,770,977
Passengers carried (fares and transfers).....	743,233,247	643,870,858	599,080,364
Revenue car-miles.....	97,356,831	91,059,219	92,481,319
Mileage in New York State.....	2,014	2,001	1,990
Operating ratio.....	83.90%	87.08%	88.34%

Railway expects to extend its use to the interurban lines. The commission says that the use of the weekly pass is now being considered in the cities of Rochester and Schenectady.

The number of accidents at grade crossings of electric railroads and highways outside of cities and villages has not increased over that of last year. Of the eight persons killed in this class of accidents, five were killed in an accident which occurred at Stop 13½ on the Schenectady-Troy Road when a five-passenger auto with curtains up, traveling the same direction as the electric car, attempted to cross the path of the trolley.

The commission says that one of the developments of the past year has been the tendency towards the formation by electric railroad corporations of subsidiary companies for the operation of bus lines. The commission expects that the extension of such bus lines as feeders to existing electric railroads will increase. It also looks forward to more extensive use of trackless trolleys in the urban districts. The commission says:

The operation of bus lines and lines of trackless trolleys by electric railways is in a more or less experimental stage. The determination of the most economical method of service, street railroad, motor bus or trackless trolley, seems to depend upon the territory to be served and the frequency of operation required. Results of operations of this character will be closely observed in order that a proper appraisal may be made of their economy and value. The commission renews the recommendation in its last report to the Legislature to the effect that the laws on the subject of automobile bus regulation should be stated in as complete detail as are the statutory provisions governing other carriers and utilities.

The commission refers to the enactment of Section 53-a of the Public Service Commission law (Laws of 1923, Chap. 901). This measure provides that all railroads operating within cities having a population of 1,000,000 inhabitants or over are required to operate all trains by electricity on and after Jan. 1, 1926. The corporations affected were directed by the commission to file plans and specifications for its approval. The New York Central Railroad accordingly filed plans covering the electrification of its railroad within New York City not already electrified, and has also filed with the Transit Commission a set of plans for the elimination of all grade crossings on the west side of New York City.

Two Participators in Dynamiting Outrage Sentenced to One Year

Maximum penalties were imposed upon two of the four striking platform employees of the International Railway, Buffalo, by Federal Judge George F. Morris of New Hampshire, for their alleged participation in the dynamiting of the Buffalo-Niagara Falls high-speed line train at Ellwood during the strike in August, 1922. The other two, who were found guilty a week ago, were given lighter sentences, but the district attorneys of Erie and Niagara counties have started the presentation of the evidence to county grand juries and indictments of the men will be asked on grounds charging more serious offenses. Francis Reilley and Healey Breeze, Buffalo, were sentenced to the Erie County penitentiary for one year and fined \$5,000 each.

This is the maximum under the section of the Sherman anti-trust law under which the four striking platform employees were convicted for conspiracy. William L. Vandell and William H. Smith, Lockport, also were jailed for one year each, Vandell being fined \$2,000 and Smith \$3,000.

Judge Morris denied the request of District Attorney William J. Donovan, who prosecuted the case for the government, for a postponement of sentence because of the presentation of evidence against the four men to the grand juries in Niagara and Erie County. The court said there is nothing to prevent the state from prosecuting the defendants even though they are serving jail sentences for offenses against the government.

The court denied the application by Ernest W. McIntyre, counsel for the defendants, for a new trial for Messrs. Healey and Breeze on the ground that insufficient evidence to implicate them in the alleged conspiracy had been introduced at the trial. Counsel then filed a bill of exceptions, laying the basis for an appeal to the United States Circuit Court of Appeals.

Three more members of the Amalgamated and officers of the local union will be placed on trial before Federal Judge Morris on Feb. 4 for their part in the alleged conspiracy to dynamite the Buffalo-Niagara Falls high-speed line train. They are John M. Parker, Niagara Falls, Ont., president of the Buffalo local; Clarence F. Conroy, Buffalo, business agent, and Vincent Tuero, financial secretary of the union.

State Senator Robert C. Lacey, Buffalo, also will be tried at the same time.

Engineers to Report

**Both Oakland Railway and City Plan
Surveys to Determine Local
Transportation Needs**

Oakland's muddled transportation situation is to be surveyed by two experts, one employed by the Key System Transit Company, the successor to the San Francisco-Oakland Terminal Railways, and the other by the City Council. This is the latest highlight in the controversy over the respective merits of one-man cars and buses.

Richard Sachse, the railway company's engineer, has already started work. Announcement of his employment was made on Jan. 23 by C. O. G. Miller, president of the company.

The Council voted the same day to undertake a survey similar to that planned by the railway, but the city's survey cannot be started until an ordinance to that end has been prepared by the city attorney.

Mr. Miller has called at the Oakland city hall and invited the co-operation of Mayor Davie and other city officials in the matter, suggesting a conference at which transportation problems could be considered. He met with a rebuff, however. Mayor Davie, backed by Commissioner Moorehead, said in effect:

"There can be no such conference until your company stops violating the law of this city. I refer to the continued operation of one-man cars in defiance of our ordinance."

The city's survey plan originated with Commissioner Colbourn. It provides for the employment of a competent engineer to recommend, after an exhaustive survey, ways of meeting the city's transportation needs. It is understood that this survey will also contain an expression of opinion on the question of whether the city shall run a competing line or procure the present system by purchase, and whether temporary bus permits shall be issued.

The Mayor and Commissioner Moorehead favor the municipal bus plan. They have already taken a flier in municipal operation by the purchase of a city bus which has now been running for about four months. Other members of the Council, however, feel that nothing should be done without expert advice and then only after the voters have had their say.

Mr. Colbourn and his colleagues are averse to antagonizing the present franchise holders. Aligned with Mr. Colbourn in this view are Commissioners Baccus and Carter. They favor co-operation with the Key System Transit Company and the State Railroad Commission.

This view may be reflected in the adjacent city of Alameda, which has just put the bus question up to the commission, after a long wrangle in the City Council. The commission is already on record as favoring the operation of one-man cars.

Mr. Sachse will study not only Oakland but the entire East Bay section. He was formerly chief engineer of the California Railroad Commission.

Dispute Over Paving Delays Improvement Program

The proposed plan of the Wisconsin Railway, Light & Power Company, Winona, Minn., to undertake a large program of track improvement during 1924 in La Crosse can not be placed in operation apparently until an agreement can be effected between the company and the City Council over the question involving the payment for paving laid in the proposed track zones.

The City Council recently adopted an ordinance approving of the company's plan to commence new extension work, but inserted a section compelling the company to pay for the pavement between its tracks. During the war the company was exempted from these charges.

The company has refused to accept the ordinance unless it is made exempt from paving costs while the Council has adopted a resolution to secure an order from the Railroad Commission to force the company to build its tracks according to the franchise and city statutes.

Opposes Construction Program

Objection has been made by Milwaukee Electric Railway & Light Company to that part of Waukesha's paving program requiring the company to co-operate with the city in certain repair work within one year. The company, however, has submitted to the city a plan of co-operation and construction covering a three-year period. The expenditure of a large sum of money for 1923 track zone repair work and a certain loss of revenue in 1924 from the interurban line between Milwaukee and Waukesha were some of the reasons given by the company for being unable to complete this work in one year.

Street Accidents Increase in Cincinnati

That the hazard of death and accident is increasing in the streets is strikingly illustrated by statistics compiled by the Department of Street Railroads, Cincinnati, with regard to the number of persons killed and injured by electric cars during 1923 as compared with 1922. The fatalities jumped from nine in 1922 to seventeen in 1923. Pedestrians struck by electric railway cars in Cincinnati increased from 151 to 201. Collisions with automobiles in 1923 were 5,089 as compared to 3,621 in 1922, an increase of 1,468. There was also an increase of collisions between electric railway cars, the figures being 647 in 1923 and only 318 in 1922.

Still, riding on electric cars is apparently becoming safer. In 1923 passengers injured were 296, as compared with 385 the year before, a decrease of 89. So, too, there was a decrease in the number of employees injured.

W. Jerome Kuertz, Director of Street Railroads, said the increase in the number of collisions and mishaps to persons

other than passengers was due, not to increasing carelessness on the part of motormen and conductors, but to the growing danger of all street traffic, and particularly to the greater number of automobiles and the recklessness of some drivers.

One Thrift Week After Another for Illinois Corporation Public

Every week this year will be "Thrift Week" for the customers and public in the territory served by the Illinois Power & Light Corporation, Chicago, Ill. Commencing during National Thrift Week, this company launched a thrift campaign that will be waged throughout the entire year. "Make This Your Thrift Year" is the slogan that will be used. The company sold more than \$2,000,000 of its 7 per cent preferred stock to consumers and the general public in the last four and a half months of 1923.

Dayton Companies Seek Temporary Restraining Order to Permit One-Man Cars

The fight of the Dayton City Railway and the Oakwood Street Railway to retain one-man cars in Dayton, Ohio, was carried into the Federal Court on Jan. 26 when the companies asked for a temporary restraining order permitting them to continue the use of one-man cars while the matter is being threshed out in the courts. The city of Dayton, Mayor Frank Hale, three city commissioners, City Manager F. O. Eichelberger, the safety director, city attorney and chief of police are made defendants in the action.

The company contends that the city ordinance ousting the one-man cars is unconstitutional, invalid and illegal in that it takes away property of the company "without due process of law" in contravention of Article V of the Fourteenth Amendment to the Constitution. Since penalties provided in the ordinance are cumulative the company sets forth that they would amount to such excessive sums pending litigation that it would prevent the companies from asserting their legal rights in court. Its effect, they set forth, is to deny the company equal protection in law. The ordinance was passed following a referendum vote on the subject last November in which the people of Dayton expressed disapproval of the system. No attempt has so far been made, however, to enforce the measure.

The principal contention of persons active in opposing the one-man car was that they are a menace to public safety although no serious accidents have been reported in Dayton which may be attributed to their use.

The hearing of the case is expected to determine the future of the one-man car in Dayton. Among other things the company's lawyers expect to attack the validity of the election on Nov. 6, claiming that an insufficient number of legal signatures was made on the petition. Numerous instances are cited by the company's attorneys as reasons why Dayton should retain the cars it now has in service.

Hearing on the motion for the temporary restraining order has tentatively been fixed for Jan. 31.

Pacific Electric Official Suggests Method of Subdividing Land

New streets being laid out along the right-of-way of the Pacific Electric Railway should be so arranged that the rear of the lots will abut the railway. Entrance to the streets should be distant approximately 150 ft. on each side of the railway. These suggestions were made by D. W. Pontius, vice-president and general manager of the company, in a circular letter to the chambers of commerce, planning commissions, realty and industrial boards and other civic organizations in southern California. The letter was prompted by the announcement of the plan for subdividing Los Angeles County. The suggestions were advanced after a study of the situation in which Mr. Pontius concluded that the policy which had been established looking toward the opening of such streets on each side of the right-of-way practically paralleling the track of the railway was a very serious one. Mr. Pontius says that residential and business property backing up to the right-of-way would increase in value more quickly than if it faced the right-of-way. He said that with the increase in population in southern California industries were a necessity and that they could not be attracted unless they could be served directly and efficiently with a railway industrial track. The circular letter contained diagrams showing the present method and the suggested method of subdivision.

Explains Delay in Constructing

Construction and operation of the proposed electric railway line by the Milwaukee Western Electric Railway, from Milwaukee to Beaver Dam and from Sussex to Waukesha, plans for which were started in 1909, will not take place before the next two years, owing to the fact that prevailing conditions have made impossible the financing of the project.

This information was given out by A. P. Kletzsch, president of the proposed line, to the Wisconsin Railroad Commission at a hearing on Jan. 7, held for the purpose of considering the advisability of revoking certificates issued in 1910 granting permission to begin the construction and operation of the line. The hearing brought out a request for a two-year extension which the commission took under advisement.

No More Postponements in Cincinnati

What the city administration of Cincinnati terms an ultimatum was served on representatives of the Cincinnati Street Railway and the Cincinnati Traction Company on Jan. 21, when the street railroad committee of the City Council fixed Feb. 11 as the "final" postponed date for the two companies to report whether they have or have not reached an agreement for the settlement of Cincinnati's traction problem.

Service Suspended in Akron

Local Cars Withdrawn in Ohio City at Expiration of Franchise, Following Refusal of City Officials to Grant Fare Increase Pending Negotiation of New Operating Contract

THOUSANDS of Akron citizens walked to work on Feb. 1 following the discontinuance of electric railway and bus service by the Northern Ohio Traction & Light Company on its Akron city lines. Other thousands walked many blocks to the company's carhouses and suburban stations from inside the city and jammed the suburban and interurban cars. The promised "adequate service" by Mayor D. C. Rybolt did not materialize. A few buses from other cities in the State are in Akron, and Henry Ford sent in 500 jitneys, but the people refused to ride them. In an advertisement in Feb. 1 papers the railway set forth a history of the negotiations and renewed its offer to continue operations provided a 6-cent fare was agreed to.

The present Akron transportation crisis had its inception on Jan. 3 when the company filed with the Ohio Public Utilities Commission a rate of four tickets for 25 cents, with a cash fare of 7 cents, effective on Feb. 1 on its Akron City lines and sent a letter to the city announcing this fact. The Ohio law provides that where there is no existing franchise, or contract, between a municipality and a street railway any rate to become effective must be filed with the State. The railway franchise at Akron was entered into twenty-five years ago. It provided for a 5-cent fare, with free transfers. The grant expired at midnight on Jan. 31, at which time the proposed new rate was to have become effective.

The company's action followed numerous efforts during the last two years to secure a new contract on a basis in excess of the old 5-cent fare. It also followed an intensive campaign covering a period of four months in which railway patrons were asked voluntarily to pay 6 cents for their ride. Incidentally this campaign met with favor. An average of 9 per cent of the riders did voluntarily pay the extra cent.

In its communication to the city announcing the new rate filed with the State, the company said that for the year ended Nov. 30, 1923, the operating results of the Akron City system were as follows:

Gross earnings	\$1,864,509
Operating expenses	1,837,802
Difference	\$26,707
Taxes	107,524
Deficit	\$80,817

In commenting on these results the company said:

From the above it will be seen that the Akron city railway did not even earn its taxes, to say nothing of depreciation and return.

We want to furnish transportation in the city of Akron at the lowest possible rate, but we cannot provide it at less than cost, plus a reasonable return on the value of the property used by the public.

Immediately the city called a meeting with representatives of the company. The company was asked by the utilities committee of the Council and the

Mayor to continue operations at the 5-cent rate for a period of sixty or ninety days. The company then asked for a statement of the basis upon which negotiations would be taken up looking toward a new contract. The Mayor, on behalf of the city, announced that he was elected on a 5-cent fare platform and that any negotiations would necessarily have to be on a 5-cent basis.

The company then announced its refusal to extend the period beyond Feb. 1. A week later the city passed an ordinance providing that the company must operate for a period of sixty days on a 5-cent fare or else get off the street. The company was given four days in which to accede to that demand. It refused to meet these terms. The ordinance further provided that the city tracks should be torn up within a period of six months from the passage of the ordinance. It also provided that the company must cease operations at the end of the sixty-day period unless the time was further extended.

At this point a citizens' committee of one hundred that had been working on a new franchise submitted its report. This committee proposed a service-at-cost contract patterned after the Cleveland grant. It provided certain extensions, the establishment of a commission to handle railway affairs in the future, provided a maximum rate of 7 cents, new bus lines and general development of the entire system.

When the report was submitted to the Mayor he characterized it as "ridiculous" and declared he would establish a bus system for Akron that "would be the finest in the world." He further announced through the newspapers that he would never agree to anything except a 5-cent fare, and that "buses would operate at that figure and make money."

The members of the citizens' committee of one hundred, the Chamber of Commerce and various other civic organizations held numerous meetings in an effort to secure a compromise. The company agreed to operate on a 6-cent basis until a new contract could be drawn. The Mayor refused to change his position. H. S. Firestone, of the Firestone Tire & Rubber Company, assured the Mayor he was in the right and said he would aid him in securing buses. The statement was made by the Mayor that 250 double-deck buses would be brought to Akron. Later he said they were not adaptable for Akron purposes, but 100 buses would be brought from Newark, N. J., and other cities. Tuesday the Mayor stated Ohio buses only would be used, while Mr. Firestone exhibited a telegram from Henry Ford saying he would lend 500 Ford sedans to the city. Wednesday the statement was made by the Mayor that there would be "ample transportation to care for the city's needs," but urged the people to "bear with me until I get the proper service established."

In the meantime the newspapers have been filled with letters, meetings have been held and the car riders have openly announced their willingness to pay 6 or 7 cents.

There is discussion about a referendum to vote on a 6-cent fare and talk of a recall of the Mayor and members of the Council. The public feels the street railway has been the football of politics long enough, if open statements by private citizens mean anything. The citizens' committee Wednesday night announced it would start a referendum as soon as it could agree with the company on a new contract.

Employment Service for Engineers

Within the past few months the employment service operated under the joint supervision of the national engineering societies has entered upon a policy calculated to insure the needed funds to provide a truly national employment service, with offices in leading cities throughout the country. Under this policy the societies continue their financial support and this is supplemented by contributions from those deriving benefit from this enterprise as no profit to anyone is to be taken, simply a self-supporting service. Contributions if on a basis of 25 per cent of the fees which must be necessarily exacted by a commercial agency will make possible the realization of a national service.

More than 55,000 engineers are members of the societies conducting the service. This membership ensures employers a selection from engineers whose records have been closely scrutinized.

Engineers seeking opportunities may arrange to obtain each week by first class mail the current list of openings. Their availability is also announced in the respective publications of the engineering societies.

Employers of engineers and those seeking competent men are urged to use the service.

Bill Introduced Against One-Man Car. House Bill No. 225, introduced in Kentucky, would require street railways in cities of the first class to employ crews of not less than one motorman and one conductor on each car operated. The bill is aimed at the use of one-man cars in Louisville, which is the only city in the State with the first-class rating. The bill has been referred to the committee on municipalities.

Interurban Seeks Court Intervention.—A petition for a federal court writ prohibiting interference with transit has been prepared by attorneys for the Chicago, North Shore & Milwaukee Electric Railway in anticipation of an ouster order, to halt what the city alleges is "illegal and unlawful" entry of trains into city over elevated rights of way. As explained previously in the ELECTRIC RAILWAY JOURNAL an opinion was prepared recently by the corporation counsel for presentation to the City Council holding that the interurban was exceeding its legal rights in operating into Chicago over the local elevated lines.

Foreign News

London Holiday Traffic

On Boxing Day (Dec. 26) the London underground group of railways, tramways, and buses carried about 3,500,000 passengers, or 500,000 more than on the corresponding day of the previous year. These figures do not include the traffic on the London County Council tramways.

No Season Tickets in Edinburgh.—Edinburgh Town Council has negatived a proposal to extend the season ticket arrangement on its tramways, which is in use on one section. The tramway manager recommended a six months experiment, but the chairman of the tramways committee stood out for no change, on the ground that season tickets would mean a tremendous loss of revenue.

Standards for British Traction Motors.—A new standard specification for the electrical performance of direct-current, series-wound traction motors has been published by the British Engineering Standards Association, superseding one previously in use. The specification keeps closely in line with that for traction motors of the American Institute of Electrical Engineers.

New Linings for London Tubes.—Contracts amounting to £765,000 have been placed by the London underground railways for 85,000 tons of cast iron lining segments to be used for enlarging the tunnels of the southern section of the City & South London Railway and for the extension about to be constructed between Charing Cross station of the Hampstead line and Kennington station of the City and South London line. No information has yet been given out as to the cost of the lining for the enlarged tunnels of the northern section of the City & South London Railway nor that of the new connecting line between it and Hampstead railway.

London Tube Railway Extension.—Work has just been begun on the extension of the City & South London Railway from its present terminus at Clapham Common to Morden on the southwestern outskirts of the metropolis, a distance of more than 5 miles, of which 4½ miles will be in tunnels. Service shafts at points near the sites of the future stations will be driven vertically into the ground to varying depths and down them will be lowered the rotary excavators which will drive the tunnels through the clay. Each excavator will have a forward drive of from 20 to 25 ft. per day. It is expected that the construction of the new line will be accomplished in record time. There will be seven stations on the extension, which will serve a population of about 300,000. It is estimated that 50,000,000 passengers will be carried annually.

London Tube Railways Install More Escalators.—At Liverpool Street station of the Central London Railway a fifth escalator of the reversible type is to be installed. The total capacity of the five will be 36,000 passengers per hour. This new moving stairway is part of the large escalator scheme mentioned in ELECTRIC RAILWAY JOURNAL Jan. 23, 1923. No fewer than twenty-eight escalators are to be installed to replace lifts, the cost being £1,000,000.

Moving Platforms for Paris

Paris authorities have been giving serious consideration to the possibility of using the *trottoir roulant*, or moving sidewalk, for the relief of the traffic congestion of pedestrians on the boulevards. The project is for a moving platform running between the Madeleine and the Place de la Republique by way of the grand boulevards.

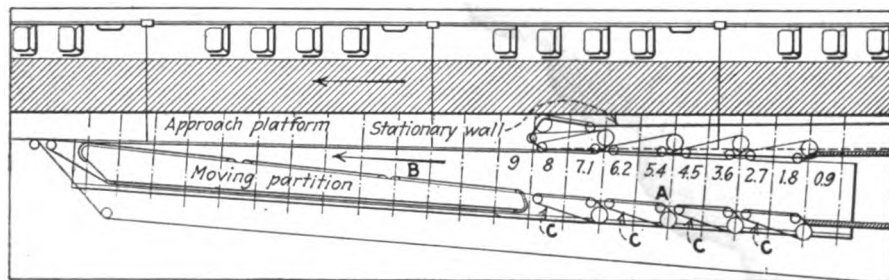
Three distinct methods are being considered. The first provides a platform divided into three parallel sections running at speeds of 3.1, 6.2 and 9.3 m.p.h. This is practically the same as the platform proposed for New York City and constructed experimentally by the Continuous Transit Company, and which was described in this paper for Nov. 24, 1923, page 899. The second plan is for a single moving platform running at the constant speed of 9.3 m.p.h.

The arrangement for gaining access to the platform is by means of a series

One phase of the question being discussed is the method of announcing stations. It has been suggested that the name of the station, accompanied by the legend "Prepare to Descend," be outlined with red electric lights on a sign about 100 ft. in advance of the station, and that at the station the name with the single word "Descend" be shown. Since there is about six seconds time for the passenger between these signs, there is some possibility that riders may have to remain on board until the next station is reached.

London Trail Cars to Be Abandoned

The London County Council has adopted without discussion the proposal to abandon trail cars on its tramway lines. This was done after the highway committee of the Council had carried out a series of tests from which it concluded that while it would be possible considerably to reduce the schedule



One of the Plans for a Paris Moving Sidewalk Has a Series of Approach Platforms Running at Graded Speeds

A—Short approach platforms. Figures show speeds in m.p.h.

B—Section of approach platform moving

at same speed as main platform, 9.3 m.p.h.

C—Flexible partitions moving at same speed as platforms alongside.

of short, narrow platforms at progressively increasing speeds. These will be arranged on the level or on a slight slope, as indicated in the plan shown herewith. They will be driven by a series of endless chains, ten speeds being provided in steps of slightly less than 1 m.p.h. from standstill to 9.3 m.p.h., the speed of the main platform.

The third plan provides partially or totally inclosed cars running at slow speeds at the stations, but automatically accelerated to high speeds between stations. This is to be accomplished by a form of worm drive, a series of endless screws being sunk beneath the platform. A maximum speed of 24 m.p.h. would be provided between stations and 3 m.p.h. at the loading platforms. The average speed attained, 12.7 m.p.h., is considerably in excess of the minimum speed of 9.3 m.p.h. demanded by the commission in charge of the project, and likewise in excess of that of the two competing systems. Methods of embarking and disembarking from the speed of 3 m.p.h. at the stations have not been disclosed.

time of trail trains, it was more economical to use motor cars only. It was considered that in order to increase the number of passengers every gain in speed is desirable, and furthermore tends to economy and to enhance the popularity of the service, which it was felt can best be done with motor cars alone. It was decided, therefore, that the tramways must keep pace with and, if possible, be in advance of other forms of transportation. Trailers were first introduced into London in 1914 after considerable opposition by the metropolitan police authorities.

Tramways or Railless

The Bradford Tramways is considering the advisability of the introduction of railless electric traction as tramway tracks in the city wear out. Already twenty railless cars are in use. Repairs and maintenance of permanent way in Bradford cost the equivalent of nearly one penny per car-mile. On the other hand, the railless system working expenses were 16½d. per car-mile, compared with 18d. for the tramways.

Financial and Corporate

Twin Cities Railways Doing Well

Report for Year 1923 Shows Balance of \$1,360,067 After Taxes and Preferred Dividends

The Twin City Rapid Transit Company, Minneapolis, Minn., and subsidiaries report for 1923 a balance of \$1,360,067, equal to \$6.18 a share on the \$22,000,000 common stock outstanding, after deducting taxes, interest, rents, preferred dividends, etc., as compared with a balance of \$1,355,201 or \$6.16 a share, on the same amount of common outstanding in 1922. The statement compares as follows:

	1923	1922
Total operating revenue..	\$13,463,111	\$13,772,647
Total operating expenses..	9,537,841	9,914,325
Net operating revenue..	\$3,925,270	\$3,858,322
Taxes assignable to railway operations.....	1,373,069	1,251,924
Operating income.....	\$2,552,201	\$2,606,398
Non-operating income....	116,936	69,241
Gross income.....	\$2,669,137	\$2,675,639
Interest, rents, etc.....	1,099,070	1,110,438
Net income.....	\$1,570,067	\$1,565,201
Preferred dividends.....	210,000	210,000
Balance.....	\$1,360,067	\$1,355,201
Common dividends.....	1,320,000	880,000
Surplus.....	\$40,067	\$475,201
Previous surplus.....	1,722,735	1,211,202
Total.....	\$1,762,802	\$1,686,403
Adjustment.....	11,290	36,332
Final surplus.....	\$1,774,092	\$1,722,735

Horace Lowry, president, in his remarks to the stockholders said that on Oct. 8, 1923, hearings were commenced before the Railroad & Warehouse Commission of the State of Minnesota for the purpose of determining the value of the property of the Minneapolis Street Railway, fixing a reasonable rate of return thereon, and the rate of fare to be charged by that company. The hearings have continued, with short recesses, but the taking of testimony had not been completed at the time he spoke.

Similar hearings will follow before the commission for the purpose of determining the value of the property of the St. Paul City Railway, fixing a reasonable rate of return thereon, and the rate of fare to be charged by that company. The railway officers are using every effort to hasten the final determination of the value of the properties.

Mr. Lowry explained that because the unsettled situation confronting the companies is likely to continue until the valuation of the properties is finally determined only such additions, extensions and improvements have or can be made as are urgently required and fully justified by increase in travel and necessary convenience to the car riders.

The engineers of the subsidiary companies have been experimenting for more than two years in the development of a light weight car which would be as

nearly noiseless in operation as possible. Mr. Lowry says it is believed they have succeeded in building a car which is in advance of anything else in operation in any other city of the country.

Net Income for Year in Philadelphia \$1,800,000

For the twelve months ended Dec. 31, 1923, the Philadelphia Rapid Transit Company, Philadelphia, reports a net income of \$1,800,000, compared with \$1,829,278 for the previous year.

In 1923 the amount available after providing the net income of exactly \$1,800,000 for the 6 per cent dividend upon the Philadelphia Rapid Transit Company stock fell short by approximately \$50,000 of providing for the full 10 per cent co-operative wage dividend upon the wages received by the employees during the year.

For the twelve months of 1923 the number of passengers was 917,787,235, compared with 848,883,512 for 1922. The passenger revenue for 1923 was \$44,249,361, compared with \$41,758,763 for 1922.

Stock Dividend Proposed in Brooklyn

A special meeting of the stockholders of the Brooklyn City Railroad has been called for Feb. 6 to take action on a proposal to increase the company's capital stock from 1,200,000 shares, par value \$10, to 1,600,000 shares of the same par value. The increase, if approved, will be distributed as a stock dividend to the shareholders.

In a letter to the stockholders Frank Lyman, president of the company, calls attention to the fact that when the company, formerly leased to the Brooklyn Heights Railroad, was returned to its owners for private operation dividends were withheld and capital expenditures in excess of \$4,000,000 were made out of the earnings. It is now proposed to issue \$4,000,000 par value additional stock against these expenditures.

With the return of the properties from the lessee in 1919, according to President Lyman, the management of the Brooklyn City Railroad was confronted with the problem of raising large sums required for capital improvements. This money was obtained by retaining in the treasury earnings otherwise available for dividends. The last dividend at the full rate of \$1 a share a year was paid on July 15, 1919, and dividends were not again resumed at the 10 per cent rate until Sept. 1, 1923, though three quarterly dividends had previously been paid at the rate of 80 cents annually. In the last four years more than \$4,000,000 has been spent for rolling stock and more than \$600,000 for track reconstruction and roadway improvement.

Opposition Develops to \$7,500,000 Stock Issue for New Orleans Company

The ordinance introduced by Commissioner Paul H. Maloney at the regular meeting of the Commission Council of New Orleans, La., on Jan. 15, granting authority to the New Orleans Public Service, Inc., to issue \$7,500,000 additional common stock for the purpose of providing funds for improvements to its property as well as to increase its dividend rate on all common stock from 8 per cent to 9 per cent appears to have encountered opposition among the members of the Commission Council. This may delay if not imperil adoption of the measure. The ordinance was to have been considered at the regular session of the Commission Council on Jan. 22, but its consideration was put off to the following day, when a special session of the Commission Council was called to take final action on the measure. No session, however, was held.

Mayor McShane is one of those arrayed against the ordinance.

Commissioner Ray said he thought the directors of the Public Service, Inc., were going too fast. There might come a time when an issue of stock by the New Orleans Public Service, Inc., paying 9 per cent might be justified, but he felt such an issue was premature now.

It has been made clear by Commissioner Maloney that the permit sought by the Public Service, Inc., to pay a 9 per cent dividend on its common stock instead of 8 per cent, as is now being paid, will not affect the rate of return of 7.5 per cent the company under the settlement ordinance, upon a rate base of \$44,000,000, which has since been increased through reinvestments to \$53,000,000.

Pittsburgh Receivers Discharged

The receivership of the Pittsburgh Railways was terminated at midnight on Jan. 31 following the signing of the final decree by Judge W. H. S. Thompson in the United States District Court. In the presence of A. W. Robertson, vice-president and general counsel, and Attorney E. W. Smith, both of the Philadelphia Company, and Attorney George E. Alter, chief counsel for receivers, C. A. Fagan, W. D. George and S. L. Tone, the order was made effective giving the property back to the owners. The road had been in receivers' hands since 1918.

Successful Year in Vancouver

The net revenue of the British Columbia Electric Railway, Vancouver, B. C., for 1923 available for interest and dividends was more than £416,472, compared with a little more than £409,233 in 1922. This fact was brought out at the twenty-seventh meeting of the company held in London in a statement prepared by R. M. Horne-Payne, chairman of the board. Mr. Horne-Payne's speech brought out that the revenue shown in the profit and loss accounts did not include any profit on

exchange derived from the remittance of money from Vancouver to London. He commended in a warm manner the invaluable services rendered by the executives in British Columbia, Messrs. Kidd, Murrin, Goward, Glover and others. He referred especially to the equitable and satisfactory settlement of the tramway fares on a permanent basis.

Way Being Cleared for Birmingham Sale

All properties of the Birmingham Railway, Light & Power Company, Birmingham, Ala., will be sold to the highest bidder at public auction within the next few weeks. Lee C. Bradley and J. S. Pevear, co-receivers, disclosed this fact to the members of the City Commission at a conference on Jan. 24 between the city commissioners and the receivers.

The principal thing which is holding back the sale of the properties is the fact that the receivers desire to abandon a portion of the Tidewater line. The City Commissioners have so far refused to consent to this change. The Tidewater line is operated from East Lake to Ensley, a distance of some 14 miles. The receivers say the Tidewater line has lost \$400,000 since it was taken over by the Birmingham Railway, Light & Power Company. It is stated that within thirty days after the matter of the Tidewater line has been satisfactorily adjusted the company can lift the receivership.

The receivers are also asking an extension of the thirty-year franchises. City Attorney Wynn stated that his opinion on this proposed franchise was not ready, but so far as he could see there would be no difficulty in this, if other matters were worked out.

Approval of \$13,000,000 San Francisco Issue Sought

The Market Street Railway, San Francisco, Cal., has applied to the Railroad Commission for permission to issue 15,000 first mortgage 7 per cent sinking fund gold bonds, each of \$1,000 par value (due April 1, 1940), secured by all the physical property of the company, and to sell \$13,000,000 face value of the said bonds for a price of 93 per cent of face value.

In this connection it has been explained that the railway desires to use the proceeds derived from the sale of these bonds for the payment and discharge of \$4,269,000 of five-year 6 per cent collateral trust gold notes, due April 1, 1924, and \$9,239,550 first consolidated mortgage 5 per cent gold bonds, due Sept. 1, 1924. The remaining \$2,000,000 face value of the proposed issue are to be held by the company, subject to further authorization by the commission, to finance not to exceed 75 per cent of the cost of additions and betterments.

The bonds proposed under this issue were offered for public subscription at 100 and interest on Jan. 8 subject to approval of the commission. The offering was timed to take advantage of the first of the year reinvestment period.

Another \$15,000 Needed for Milwaukee Survey

If the survey now under way by the street railway acquisition committee at Milwaukee, Wis., in connection with the proposal for the city to take over the property of the Milwaukee Electric Railway & Light Company is to be concluded an additional \$15,000 to carry on the work will be needed. The last appropriation of \$7,500 has been exhausted. The new appropriation has been included in the 1924 budget, but the additional expenditure must be approved by the finance committee of the Council. If the expenditure of additional money is approved it will make the total spent by the city in this investigation and study approximately \$50,000. Fred S. Hunt, chairman of the acquisition committee, declares that this will be the final appropriation and promises that the work will be completed within the next three or four months. The company's properties have been valued up to and including 1919, but compilations remain to be made of extensions and improvements carried out since that time.

York Railways Does Better

The York Railways, York, Pa., reports gross earnings of \$2,007,461 for the year ended Nov. 30, 1923. The net income after paying interest and taking care of bond discount was \$391,671. This compares with \$303,331 for the previous year. The properties at York under the York Railways include the railway lines, the Edison Light & Power Company, the York Steam Heating Company, the York Suburban Land Company and the York Transit Company. The last mentioned is the bus operating subsidiary. It is at present operating one vehicle. This bus was placed in service on Aug. 17 between Dover and Dillsburg, a distance of 14 miles. It connects with the Dover line, thus furnishing transportation from Dillsburg and Wellsville to York.

The pamphlet report explains that the railway receipts indicate that the effect of automobile travel has been offset in the city, where satisfactory gains now appear, but that this point has not yet been reached on the suburban lines, where the decrease in riding continues. It is explained that this condition is obviously due to the extension by the state and county of the system of concrete roads and the increased use of private motor cars. The combined railway receipts show an increase of \$17,000 as compared with the year 1922.

Auction Sales in New York.—At the auction rooms of A. H. Muller & Sons there were no electric railway securities sold this week.

Sale of Winona Interurban in Prospect.—Negotiations are said to be under way for the purchase of the Winona Interurban Railway by interests connected with the Interstate Public Service Company, Indianapolis, Ind. The Winona property, extending from Peru to Goshen through Warsaw and Winona

Lake, is the connecting link in a through interurban route from Louisville through Indianapolis to South Bend and Chicago. The company has been in receivership for many years.

New Member on Board.—The directors of the Monongahela-West Penn Public Service Company, Fairmont, W. Va., have elected Harry Restofsky a member of the board to succeed E. Baline Moore.

Officers Elected.—The Shamokin & Mount Carmel Transit Company, Mount Carmel, Pa., at the annual meeting of stockholders elected William Kiefer, Mount Carmel, president and general manager. He succeeds E. W. Samuel. Other officers of the company vice-president, F. W. Magrady; controller and secretary J. B. McConnell, Ashland; treasurer, Fred Kiefer; solicitor, Voris Auten. The directors are: F. W. Magrady, Thomas J. Kiefer, J. Edgar Reed, Claude E. Womer, J. D. McConnell, W. A. Phillips and Fred Kiefer.

Fewer Passengers in St. Louis.—The United Railways, St. Louis, carried 318,278 fewer persons during the quarter ended Dec. 31, 1923, than for the corresponding quarter in 1922. The figures were 70,895,101 for the 1923 quarter compared with 71,213,379 in the same period in 1922. The average number of cars in use during the 1923 quarter was 1,411 on week days, 1,333 on Saturdays and 675 on Sundays. This is slightly more than for the similar period during 1922.

Railway Sells Park.—Brookside Park, between Athol and Orange, Mass., has been sold by the Northern Massachusetts Street Railway to George Donley, Orange, who for four years past has managed the park under a lease from the company. The park comprises 16 acres, with baseball diamond and amusement pavilions.

Branch Discontinuance Allowed.—Permission has been granted by the California Railroad Commission to the San Francisco-Sacramento Railroad to discontinue operation of its San Ramon branch between Saranap and Diablo. It was shown at public hearings conducted by the commission that the company was unable to finance the necessary repairs and construction work to place the line in proper working order and that its continuance would work hardship upon the company.

\$4,000,000 of 6½ per Cent Bonds Offered at Par.—Alexander Brown & Sons, Baltimore, and E. H. Rollins & Sons, New York, offered for subscription at par and interest on Jan. 28 \$4,000,000 of Maryland Electric Railways first and refunding 6½ per cent bonds, due Jan. 1, 1957. The utility represents a consolidation of the principal subsidiaries of the United Railways & Electric Company, which does the entire electric railway business in and around Baltimore. The bonds, while bearing the guaranty of the United Railways & Electric, are also a first mortgage on a portion of the company's properties and a direct mortgage on the balance. During the past ten years the company has never failed to earn more than 2.16 times all charges.

Traffic and Transportation

Sentiment Favors Railway

Many Expressions of Appreciation at
Atlanta of Work of Local Company
Seeking Fare Advance

William Pollard, well-known Atlanta labor leader, on Jan. 23, not only advocated the proposed changes in fares for the Georgia Railway & Power Company to 10 cents, with 2 cents for a transfer, but recommended that other labor indorse them as well. Mr. Pollard's statement was made at the close of an address by H. M. Atkinson, chairman of the board of the company, before the Atlanta Federation of Trades at the Labor Temple.

Mr. Pollard declared that the railway offered the only real means of transportation the average laboring man had, and that it would indeed be most unfortunate if its ability to serve the public was reduced either by design or inadvertently. He said further that the railway was the only employer, to his knowledge, that had offered to let the public audit its books and help it find a fair way to manage its business. He said:

Let's give the company a living wage. If there's a fairer plan, let's show it to the officers of the company. If there isn't, let's try this one out. The company has done its best to be fair with us in this matter—let's be fair to it.

Real estate men came to the rescue of the company at the third public hearing on its proposed changes in rates held on Jan. 22. They declared that only 10 per cent of the people of Atlanta had any means of transportation other than the railway and pointed out the vast amount of money paid by the company in taxes each year.

J. R. Smith, local real estate dealer; Hollins Randolph, chairman of the Stone Mountain Memorial Association, and Mr. Atkinson were the principal speakers.

Mr. Smith sprang a surprise on the meeting when he told how the real estate interests he represents had offered to build the necessary railway extensions and give them to the company in order to have cars operated to the suburbs. The railway had, however, been compelled to refuse to accept this offer, as it could not afford to operate cars on the tracks even if the property owners built them and gave them to it. He said the company should be protected against the loss of its profitable short-haul traffic to the jitneys while it is compelled, by its contracts, to haul people a distance of 15 miles in some instances for a 7-cent fare. Mr. Smith said that the company had paid more than \$5,750,000 in ad valorem taxes since the present contract was put into effect, and as the largest single taxpayer in the city it was entitled to some consideration.

Mr. Atkinson spoke about the injustice of compelling the railway to pay paving taxes when it was really the jitney and the automobile that were

the paving out. He then went into the history of the paving charge from the old horse car days.

A change in fare of from 7 to 10 cents, elimination of jitneys from streets on which street cars are operating and relief from paving assessments are some of the things the railway is asking of the Council. A series of public hearings is being held in order that both the company and jitney operators may give their sides of the case.

Jacksonville Fare Issue Continued

The hearing on the application of the Jacksonville Traction Company, Jacksonville, Fla., for an increase in fares has been continued until March 4. The company has not asked for a specific increase. Meanwhile the fare will remain at 7 cents.

The chief witness for the company was C. F. W. Wetterer, vice-president. He said that the 3 per cent gross tax, the paving charges and the free rides to city employees were burdens the company should not be called upon to bear. In referring to the 7-cent fare, which was put into effect in December, 1920, he said that the number of passengers decreased 17 per cent against the estimated 14 per cent, but that the gross receipts increased. One of the main reasons given for the loss in passengers was the increase in the number of automobiles.

Charges Illegal Operation of Jitneys in Muncie

The Union Traction Company of Indiana recently started suit in the Superior Court against twenty-five owners of jitneys in Muncie, Ind. The company asked for an order enjoining the defendants from operating buses on streets upon which the tracks of the company are laid until a notice of hearing can be given for a permanent injunction.

The railway contends that all of the defendants are operating contrary to the city ordinance affecting jitneys; that they so operate their buses as to precede the plaintiff's cars until the bus has gathered the desired load; that the speed of the jitneys imperils the safety of passengers and employees on the railway, and that more than 1,000 passengers a day are carried by the buses who would ordinarily be accommodated on the street cars. The company also charges that few of the jitneys have paid either the license or the registration fee.

The company charges, in short, that the operation of jitneys on the street is an unlawful invasion of the plaintiff's franchise with the city. The company then goes on to show the contrast in the amount of taxes paid by the defendant and by the railroad company itself.

Rate Matter Settled Out of Court

The suit of the Augusta-Aiken Railway & Electric Company against the Georgia Public Service Commission was dismissed on Jan. 23 in the Federal Court at Atlanta following an agreement of counsel on both sides.

The case originated in May, 1921, when the commission ordered a reduction in rates in the territory served by the company. The company, in turn, sought an injunction to prevent the rates ordered by the commission from being put into effect.

Later Judges King, Sibley and Clayton, of the Federal Court, granted an interlocutory injunction restraining the commission from interfering with the 10-cent fare then being charged, but permitting the commission to enforce the lower light and power rate schedule as laid down by it. There the matter has rested since the granting of the injunction some months ago. Under the terms of the settlement just reached the company will charge the rates for light and power ordered by the commission, but will continue to charge a 10-cent fare on the railway.

Fare Increased.—The Hutchinson Interurban Railway, Hutchinson, Kan., has been authorized by the State Public Utilities Commission to increase its fare from 6 cents to 8 cents.

De Luxe Buses for Providence.—The United Electric Railways, Providence, R. I., will place in operation shortly after Feb. 15 on its Providence-Arctic line three Fageol safety coaches. This bus route is not new, but has now in operation buses of an older and less commodious type. A number of independent jitneys also follow this route.

Five-Cent Fare Will Continue.—The 5-cent fare on the lines of the Public Service Railway in New Jersey will continue for the present at least, although the four months trial period, which started on Oct. 1, expired on Feb. 1. The 5-cent rate was adopted by the company on Oct. 1 at the suggestion of the State Board of Public Utility Commissioners after the company had filed a tariff for a 10-cent cash fare. The company's financial report for the first two months of the period showed deficits of more than \$300,000 monthly.

Additional Bus Provided.—The Twin State Gas & Electric Company on Jan. 9 began operating an additional bus from West Brattleboro to Brattleboro, Vt., due to an increase in patronage.

Bus Franchise Awaits Ratification.—The Board of Public Works of South Bend, Ind., recently approved an agreement for a ten-year franchise to the Chicago, South Bend & Northern Indiana Railway for the operation of buses subject to ratification by the Common Council. A clause in the agreement entered into by the board and the traction company provides that the buses shall operate on schedules after June 1, 1924 and shall carry no advertising on the outside of the buses other than the name of the line. The new route is from Washington Avenue and Main Street, and after passing through various streets, back to its starting point.

Fight on Trolley Bus Routes.—The railroad and telegraph committee of the City Council of Toledo, Ohio, has approved the Fearing-Detroit Avenue route for the new cross-town line to be 5.5 miles in length and twelve trolley buses. This is the route recommended by Street Railway Commissioner Cann. Another longer route was approved by the city plan commission based upon studies made by its own engineers and investigators. The cost of the project is estimated at \$157,000.

Tickets and Buses in Cumberland.—The Cumberland Electric Railway, Cumberland, Md., put two buses in operation Jan. 1 connecting with and transferring to the electric lines. The bus fare is 10 cents, which includes transfer. The transfer from the electric line to the bus costs the fare plus 3 cents additional at the transfer point. The bus line will be an experiment and, if satisfactory, additional lines will be routed to cover other sections of Cumberland to suburbs not served with traction lines. Every effort will be made to attract more passengers to patronize the cars and buses.

Announces Fare Increase.—The Cleveland & Eastern Traction Company has announced an increase in fare effective Jan. 27, subject to the approval of the Ohio Public Utilities Commission. The rate of fare from Lee Road to Chardon will be increased from 75 cents to 90 cents. The rate to Burton will be raised from 80 cents to \$1 and to Middlefield it will be \$1.20 instead of 95 cents. Robert D. Beatty, general manager, stated that if this did not remedy the trouble there would be an application to the Public Utilities Commission for abandonment as the revenue had not met the operating expenses and taxes.

"Front Way Out" in Williamsport.—The Williamsport Passenger Railway, Williamsport, Pa., has started a "front way out" policy. All cars now stop at the near side of all crossings. Passengers enter by the rear doors and leave by the front doors. In the past passengers were accepted at either end.

Proposes Uniform Five-Cent Fare.—A uniform 5-cent fare in the city of Providence on trolleys, buses and jitneys was proposed in a bill introduced in the House recently by Representative James H. Kiernan of Providence and referred to the judiciary committee. The proposed act directs the Public Utilities Commission to devise a system of schedules and rates and place the 5-cent fare in operation not later than July 1, 1924.

Bus Suggested to Replace Railway.—The Pacific Electric Railway Los Angeles, Cal., has applied to the Railroad Commission for a certificate to operate an auto stage service between Pasadena and Shorb in place of the electric railway service now maintained.

Changes in Bus Operation Sought.—The Jamestown Street Railway, Jamestown, N. Y., wants a new deal with respect to bus operation. The company discontinued bus service on Jan. 1 on

the North and South side lines because the results were unsatisfactory. These lines are operated under temporary permits whereas the West side bus line, understood to have been profitable, is run under a franchise that does not expire for three and a half years. In order to provide adequate bus service and justify the investment of the addi-

tional capital the company wants a blanket franchise of twenty years. It also wants a 10-cent bus fare with transfer from bus to bus or bus to trolley and a 2-cent charge for a transfer from a trolley to a bus. The fare on the railway and the bus has been the same, 8 cents cash with five tickets for 35 cents.

Legal Notes

IOWA — *Time When Passenger Has Alighted Defined.*

An instruction that if, after the car stopped to permit the passenger to alight, and she had a reasonable time to do so and stepped from the car to the pavement, and, after alighting from the car and being free therefrom, she fell to the pavement and sustained injuries, the carrier would not be liable, fully and properly covered a refused instruction that the relation of carrier and passenger continued only to the time she left the car. [Mathis vs. Des Moines City Ry., 195 Northwest Rep., 620.]

KANSAS — *Operation of Unprofitable Extension of Street Car Line Required.*

A street railway company built an extension, operation of which proved unprofitable, and it was abandoned, but the company still operated by virtue of the franchise, 4.6 miles of railway. The court held that the operation of the extension may be compelled by mandamus. [City of Salina vs. Salina Street Railway, 220 Pacific Rep., 203.]

MASSACHUSETTS — *Duty of Company in Case of Crowded Car.*

Evidence showed that the plaintiff entered the car when there was ample room in it and took her seat. Later, the car became very crowded. When she left, she managed with hard struggling to get out to the vestibule, where she got pushed out of the door. The conductor was standing at his post and said nothing and did not ask if she was hurt but started the car right off. The court found this action did not show any breach of duty by the company. [Rogers vs. Boston Elevated Railway, 141 Northeast Rep., 285.]

NEW JERSEY — *Automobile Driver Not Licensed May Recover for Injuries.*

The rule established in New Jersey is that where one who is unlawfully traveling on a highway, as in an automobile which has never been registered under the statute and without a driver's license, in violation of the statute, is injured by the negligence of another, he may recover for his injuries, unless his violation of the law contributes to the accident or is its proximate cause. [Muller vs. West Jersey & S. R. Co., 122 Atlantic Rep., 693.]

NEW YORK — *Statutory Responsibility of Automobile Driver Dependent on Proper Location of Disc Sign.*

Where a disc sign, provided for by

Railroad Law, Sec. 53-a, was located only 230 feet from a crossing in the open country, where physical conditions did not interfere with the location of the sign at the required distance of 300 feet or more from the crossing, the statutory duty of an automobile driver to reduce speed to a safe limit and to proceed cautiously did not attach. [Fleahman vs. Schenectady Railway Company et al, 201 New York Sup., 607.]

TEXAS — *Whether Car Split Switch Because of Street Railway's Negligence Held for Jury.*

Where a car "split" a switch, resulting in a sudden stop of the car, and a jury in the county district court held that the company was not liable for the accident, presumably on the theory that gravel from the adjacent road may have been thrown into the switch by the movement of the first truck, the Court of Civil Appeals of Texas will not interfere with the verdict. [Heck et al. vs. San Antonio Public Service Company, 255 Southwest Rep., 811.]

TEXAS — *A Construction Company Is Required to Use Ordinary Care in Placing Things on the Street Attractive to Children.*

The rule that most things can be constructed by an owner on his property without any thought of injury to children who may trespass thereon should not be extended to structures erected wholly or in part upon the public walks and streets. Hence, a seven year old child, injured while at play on cross-ties piled partly on a public sidewalk, is not guilty of contributory negligence as a matter of law. [Charles vs. El Paso Electric Railway, 254 Southwest Rep., 1094.]

UTAH — *Passenger Who Had Standing Room Elsewhere Held Contributorily Negligent in Assuming Position on Crowded Side Steps of an Open Car.*

A passenger who suffers discomfort and is injured through the carrier's fault in failing to provide adequate accommodations and protection may recover damages for those discomforts as well as for his injuries. This ruling, however, does not cover the case of a passenger who, to avoid the heat and smoke in a smoking car, where he had standing room, left it and boarded the already over-crowded side step of an open car from which he fell when the car lurched in passing over a crossing. [Taylor vs. Bamberger Electric Railway, 220 Pacific Rep., 695.]

Personal Items

Important Transfers in Stone & Webster Organization

David Daly, formerly district manager of the Middle West group of properties under Stone & Webster executive management, has been elected president of the Blackstone Valley Gas & Electric Company, Pawtucket, R. I.

Samuel B. Tuell, formerly district manager Houghton County Electric Light Company and Houghton County Traction Company, Houghton, Mich., has been made district manager of the Middle West companies in place of Mr. Daly, these including the Mississippi River Power Company, Keokuk Electric Company, Keokuk, Iowa; Fort Madison Electric Company, Fort Madison, Iowa; Paducah Electric Company, Paducah, Ky., and also the Houghton companies above mentioned.

Walter H. Burke, who has been manager of the Keokuk Electric Company, has been appointed manager of the Houghton County companies.

Walter M. Bird, formerly manager of the Fort Madison company, succeeds Mr. Burke as manager of the Keokuk company.

Philip M. Wentworth, formerly assistant manager of the Truckee River Power Company, Reno, Nev., has been appointed manager of the Fort Madison company.

H. U. Wallace Appointed to Knoxville

H. U. Wallace has been appointed assistant general manager of the Knoxville Power & Light Company, Knoxville, Tenn. He goes to Knoxville from Little Rock, Ark., where since early 1923 he has fulfilled the duties of assistant general manager of the Arkansas Central Power Company.

Mr. Wallace is the personification of activity, having at various times with untiring energy given his best to many utilities, including the Western Light & Power Company, the Chicago, Lake Shore & South Bend Electric Railway and the Fort Dodge, Des Moines & Southern Railway. His earliest well-known connection was with the Illinois Central, which he served in the rôle of superintendent and chief engineer from 1894 to 1905. He then branched off in private consulting work, only to return to the utility game as general manager of the Chicago, Lake Shore & South Bend Interurban. While he served the Fort Dodge, Des Moines & Southern Company he supervised the completion of the electrification of that line, which was part electric and part steam. Mr. Wallace was again in the limelight in 1912 upon his acceptance of the post of vice-president and general manager of the Western Light & Power Company. Here he remained until 1918, when he joined the army as Major of Engineers. He left the service on April 1, 1919, en-

gaging in private practice until his appointment early in 1923 as assistant general manager of the Little Rock Railway & Electric Company.

Harry Reid Heads C.E.R.A.

President of Indianapolis-Louisville Interurban Elected at Indianapolis to Direct Work of Association

Harry Reid, outstanding progressive among interurban men of the central territory, was elected president of the Central Electric Railway Association at its meeting in Indianapolis on Jan. 25. Mr. Reid is best known as president of the Interstate Public Service Company, which operates a high-speed interurban line between Indianapolis and Louisville and an extensive system of light and power properties in this territory, but he is



Harry Reid

also president of the Kentucky Utilities Company, supplying gas and light and power to a group of Kentucky communities.

The activities of Mr. Reid's companies have frequently been the subject of articles in this and other publications, since he has been in a measure pioneering in the central territory through his work of developing the lines now operated as one system between Indianapolis and Louisville. This development has included the installation of high-speed modern passenger cars, the inauguration of a very successful and rapidly growing freight business, the general modernization of the property, and more recently the inauguration of club-dining car service, with sleeping cars on order for installation within the next few months.

Mr. Reid is distinctly one of the doers in the utility business. He has surrounded himself with an active organization which is succeeding in developing a rapidly increasing business in all departments. He has been active in both the national railway and power associations as well as the state and sectional associations in his territory and is one of the most popu-

lar of the executives in the central district. He was recently made a member of the executive committee of the American Electric Railway Association.

Mr. Reid was born in Johnstown, N. Y., on Dec. 31, 1879. He entered the utility field at the age of twenty-one years as cashier with the Fulton County Gas & Electric Company, Johnstown. He served that company in every capacity except manager until 1907, when he went to Kentucky and located at Versailles, where he bought and rebuilt the electric lighting system. Completing this, he followed up his work by syndicating a number of utility properties in that territory. Out of these operations grew the Kentucky Utilities Company, with offices in Lexington. Mr. Reid was vice-president and general manager of this company. In 1916 the offices of this company, then owning and operating thirty-six utilities in Kentucky, were moved to Louisville. Meantime, Mr. Reid had succeeded in interesting the Insull interests in this territory and the Kentucky Utilities Company became a part of the Insull holdings and Mr. Reid was made president. Later the properties which now are comprised in the Interstate Public Service Company were purchased and Mr. Reid became president of that company in 1917.

Undoubtedly one of the strongest reasons for Mr. Reid's success in the utility business has been his keen sense of the interests of the public. He is steadily aiming to provide a superior service and that policy is responsible for the return the public is giving in the way of growing business.

New Officers Named for Pittsburgh Railways

Thomas Fitzgerald, who has been acting for the Philadelphia Company in connection with the handling of that company's interests in the Pittsburgh Railways, has been appointed general manager of the Pittsburgh Railways.

Frank R. Phillips, long associated with the Pittsburgh Railways as superintendent of equipment, acting manager and general manager under the receivers, has been appointed mechanical and electrical engineer of the company.

William H. Boyce, now with the Beaver Valley Traction Company, has been appointed commercial manager of the Pittsburgh Railways.

Announcement of these appointments was made on Feb. 1 following the lifting of the receivership that day.

George Kuhn, acting superintendent of equipment of the International Railway, Buffalo, for the last five months, has been appointed to the position permanently. He will report to H. L. Mack, vice-president of engineering.

A. M. Farrell, formerly traffic manager of the Eastern Wisconsin Electric Company in Oshkosh under B. W. Arnold, who recently resigned in order to assume the management of the motor coach department of the Chicago, North Shore & Milwaukee Railroad, has been placed in charge of the street and interurban railway properties of the company in Oshkosh. He will work under M. H. Frank.

Fred E. Schornstein, whose resignation from the Eau Claire property was referred to in the *ELECTRIC RAILWAY JOURNAL* for Jan. 19, will join the Adirondack Light & Power Corporation at Schenectady, N. Y.

Obituary

Henry St. Clair Putnam

Henry St. Clair Putnam, well-known consulting engineer of New York, died Jan. 30. His most important work in the electric railway field was that which he did for his firm in connection with the electrification of the Manhattan Elevated Railroad, New York, the system of the Interborough Rapid Transit, that city; the Hudson & Manhattan Railroad, operating under the river between New York and New Jersey, and the Westchester & Boston Railroad, a high-speed electric line on a private right-of-way extending out of New York into Westchester County. More recently Mr. Putnam had turned his attention to the possibilities of the moving platform. He was president of the Continuous Transit Company, which installed a demonstration plant in Jersey City, described in the *ELECTRIC RAILWAY JOURNAL*, issue of Nov. 24, 1923.

Mr. Putnam was a man of unusual talents. He was educated in both law and science, but after engaging for a short while in the practice of law, he turned to engineering. He first served with the Thomson-Houston Electric Company. He next turned to the manufacture of arc light carbons and served with the Thomson-Houston Carbon Company, the Brush Carbon Company and the American Carbon Company. Later he established himself as a consulting electrical engineer in Chicago, where he worked from 1896 to 1900. He then removed to Philadelphia, where he remained for two years. Following this he entered into partnership with L. B. Stillwell forming the firm of Stillwell & Putnam, with which he remained from 1902 to 1922. He was also consulting engineer for the Hoosac Tunnel electrification of the New Haven Railroad.

Charles Kilgour, vice-president of the Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, died Jan. 18. Mr. Kilgour was an electrical engineer and after he was graduated from schools in the East he became associated with the Thomson-Houston Company of Lynn, Mass., which later became the General Electric Company. He remained with that concern until he retired from active business some years ago. Mr. Kilgour had been making his home in Ripley, N. Y., for the past five years. The Toledo, Bowling Green & Southern Traction Company, of which Mr. Kilgour was vice-president, is owned by Cincinnati interests. Mr. Kilgour was fifty-eight years old. He was the son of John Kilgour and brother of Bayard Kilgour, both of whom have long been prominent in traction affairs in Ohio.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Equipment Makers Doing Well

Prosperity Among Them is General—
Laconia Car Being Put on
a Firm Basis

Preliminary reports in which estimates are made of the earnings of the makers of railway equipment of all kinds indicate that such companies generally had a very good year during 1923. Moreover, it has been shown that a considerable quantity of business has been carried over into 1924 and that plants generally are booked ahead for fairly long periods. Best of all, no diminution is being shown in the amount of new business coming in.

All this has been reflected in the market price for the equipment shares. On the whole, these prices have climbed steadily in accordance with the increase in their intrinsic worth until some record high prices of recent years have been made. On the other hand, there have been one or two sensational advances in the quoted price of securities based on reports of consolidations or purchases that have not materialized.

Naturally the makers of equipment have been enabled in consequence of the steadily increasing volume of their sales, materially to strengthen their financial position. In the car building field one of the companies that has per-

haps been helped most by the uninterrupted demand for manufactured articles is the Laconia Car Company. In consequence the officers of that company have under way a plan of readjustment of the capital of the company which it is thought will take care of its financial needs for some time. For the past three years the business of the company has been good and prospects appear ahead that would justify the resumption of dividend payments. The credit of the company, however, and the limited working capital have been such that it was hardly practical to consider this until some means had been found for raising the money necessary to pay the present accumulated dividends on the preferred stock.

Part, at least, of these dividend accumulations of \$700,000 on the preferred stock could be paid in cash, but it has been deemed wiser not to deplete the company's working capital. In lieu of the payment of the accumulated dividends in cash it has been proposed that preferred holders be given an additional 10,000 shares of common stock and that the right be reserved to them to convert their preferred stock into common stock on the basis of one share of preferred for four and one-half shares of common if converted within ninety days from the date the plan is declared operative, or for four shares if converted later. It was voted by the stockholders on Jan. 25 to put this plan

ELECTRIC RAILWAY MATERIAL PRICES—JAN. 30, 1923

Metals—New York

Copper, electrolytic, cents per lb.	12.687
Lead, cents per lb.	8.025
Nickel, cents per lb.	28.00
Zinc, cents per lb.	6.837
Tin, Straits, cents per lb.	48.25
Aluminum, 98 to 99 per cent, cents per lb.	27.50
Babbitt metal, warehouse, cents per lb.	
Fair grade.	52.00
Commercial.	25.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads.	\$5.75
Somerset mine run, Boston.	2.25
Pittsburgh mine run, Pittsburgh.	2.00
Franklin, Ill., screenings, Chicago.	1.875
Central, Ill., screenings, Chicago.	1.45
Kansas screenings, Kansas City.	2.25

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton.	\$43.00
Standard open hearth rails, gross ton.	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.10
Tie plates (flat type), cents per lb.	2.575
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.125
Steel bars, cents per lb.	2.40
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	\$1.70

Hardware—Pittsburgh

Wire nails, base per keg.	3.00
Sheet iron (28 gage), cents per lb.	3.85
Sheet iron, galvanized (28 gage), cents per lb.	5.00
Galvanized barbed wire, cents per lb.	3.80
Galvanized wire, ordinary, cents per lb.	2.75

Waste—New York

Waste, wool, cents per lb.	.15
Waste, cotton (100 lb. bale), cents per lb.	
White.	12-18
Colored.	9-14

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	\$0.94
White lead (100 lb. keg), cents per lb.	11.60
Turpentine (bbl. lots), per gal.	\$1.03
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4-6

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	15.375
Rubber-covered wire, No. 14, per 1,000 ft.	\$6.65
Weatherproof wire base, cents per lb.	17.00

Paving Materials

Paving stone, granite, 4x8x4, f.o.b.	
Chicago, dressed, per sq. yd.	\$3.60
Common, per sq. yd.	3.20
Wood block paving 3½, 16 treatment, N. Y., per sq. yd.	2.56
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots.	54.00
Crushed stone, ½-in., carload lots, N. Y., per cu. yd.	1.75
Cement, Chicago consumers' net prices, without bags.	2.20
Gravel, ½-in., cu. yd., f. o. b. N. Y.	2.00
Sand, cu. yd., N. Y.	1.25

Old Metals—New York and Chicago

Heavy copper, cents per lb.	10.50
Light copper, cents per lb.	9.50
Heavy brass, cents per lb.	6.00
Zinc, old scrap, cents per lb.	4.25
Yellow brass, cents per lb. (heavy).	6.00
Lead, cents per lb. (heavy).	7.25
Steel car axles, Chicago, net ton.	\$19.25
Old car wheels, Chicago, gross ton.	20.75
Rails (short), Chicago, gross ton.	20.75
Rails, (relaying), Chicago, gross ton.	33.50
Machine turnings, Chicago, net ton.	10.25

into effect just as soon as substantially all the stock had been deposited.

It might appear at first sight that the details just recited are of primary interest to the holder of Laconia shares. As a matter of fact they are, but behind them the larger story is reflected of the increased prosperity of the equipment makers as a whole.

First Month of 1924 Fortifies Confidence in Business Outlook

Events at the turn of the year have further fortified confidence in the business outlook. Buying is still generally conservative, but conditions in most branches of business do not call for heavy inventory accumulations. Nevertheless, activity in some lines is exceeding most expectations. No less an authority than the Guaranty Trust Company, New York, points out that the most significant feature of recent prices in this country is the comparative steadiness of their average, despite a slight net decline in 1923, as compared with a more pronounced increase in the preceding year.

Another factor to which commentators on the economic trend refer is the progress made toward the resumption of customary relationships between prices, since the early reactions from the swift decline in 1920-21, represents a cumulative strengthening of the bases of economic well-being. In the absence of a sharp general movement in either direction, further correction of remaining disparities may be expected. And neither in the banking and currency situation nor in the state of industry and trade is there indication of a coming general disturbance of prices.

A revival of price inflation in consequence of the large gold supply, which was so freely predicted, has not appeared. The reserve holdings of gold, however, are greatly in excess of legal requirements, and in a sense they do make possible an inflation of bank credit. On the other hand, the administration of the banks gives no indication that the present gold stocks will be treated as if they were expected to remain indefinitely around present levels. With the persistence of a wholesome restraint upon any tendencies toward inflation of credit and prices, there is preserved also a powerful potential check upon influences tending to depress prices. When the expected redistribution of gold does begin, the reduction of stocks in this country will probably be effected gradually with a corresponding gradual reduction in the American level of commodity prices.

Automotive Car Division Formed by Brill Company

The J. G. Brill Company has formed the automotive car division, with C. J. McPherson, sales manager, to take care of the increased demand for the gasoline rail car. All renewal part business for cars of this type now in service and other types of these cars for steam railroads, ranging from the thirty-passenger six-wheel type of the Model 55, with a maximum seating capacity of fifty-five, will also be handled by this division. The company purchased the railroad motor

coach division of Service Motors, Inc., Wabash, Ind., some months ago, with exclusive rights for the production and sale of the type of gasoline rail car heretofore known as Service Model 55 Railroad Motor Coach.

Rolling Stock

Pittsburgh Railways, now that the receivership has been lifted, will spend \$3,000,000 for new rolling stock under the terms of the plan of the reorganization.

Worcester Consolidated Street Railway, Worcester, Mass., during 1923 spent \$72,000 for snow sweepers and dump cars.

Pacific Northwest Traction Company, Everett, Wash., has ordered three buses of twenty-eight-passenger capacity each, for use on the company's lines between Mount Vernon and Everett.

Georgia Railway & Power Company, Atlanta, Ga., in its budget for 1924 has included the purchase of twenty new cars.

Cincinnati, Newport & Covington Railway, Covington, Ky., will request authority for the purchase of twenty cars of the double-truck type of its board of directors. The announcement was made by General Manager Harton at a recent conference of the city commissioners of Covington. Mr. Harton said that the additional equipment would improve the company's service in northern Kentucky about 30 per cent. Approximately \$250,000 will be appropriated for the purchase of the new cars.

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But meanwhile---



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Here's something we can do now to save money.

Every accident means expense! Even if you escape paying damage claims, you've got the cost of accident reports, investigation and other claim department work to meet. And, maybe, a damaged car to repair!

Peacock Brakes make operation safer! They afford a powerful, quick, reliable emergency equipment for stopping the car.

Moreover, they require practically no maintenance. Figure this against present maintenance on inadequate hand brakes.



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Especially adapted for the modern, light-weight safety car, both single and double-truck. Minimum platform space, light-weight, high braking power.

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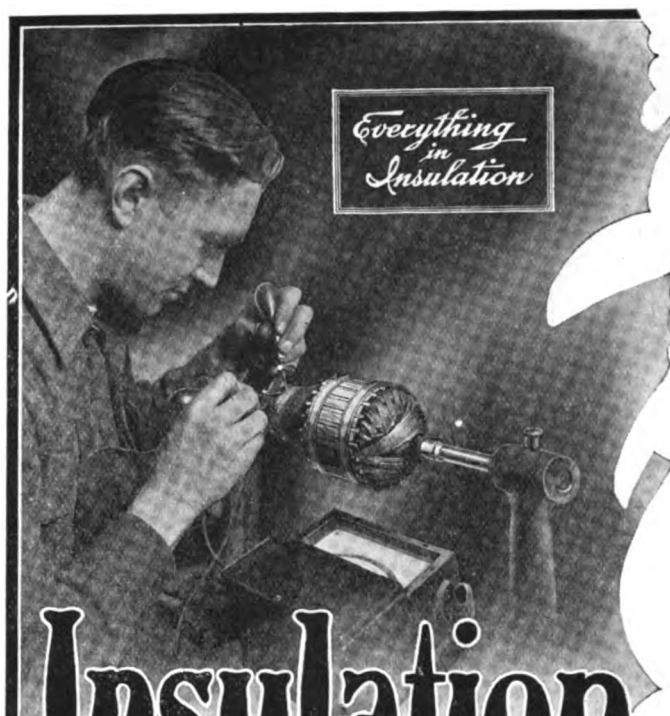
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 DETECTIVES

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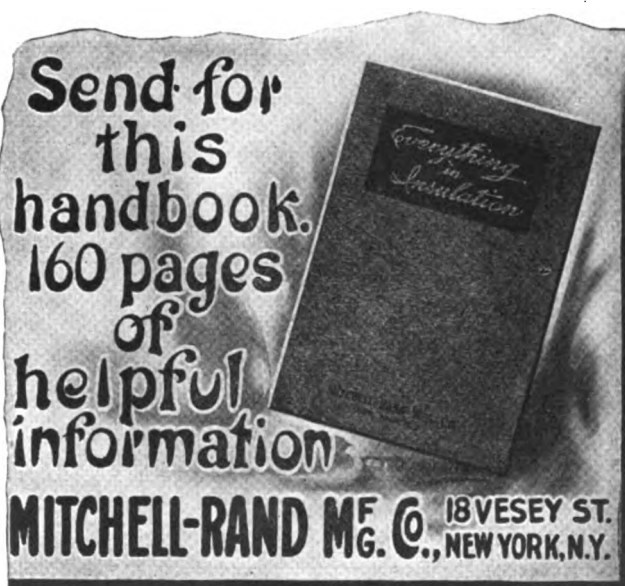
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Failure of electrical apparatus is almost invariably due to the use of poor insulation rather than to careless workmanship. When quality difference is measured by cents, why not select materials that are guaranteed to pass standard tests?





The First Step to BETTER TROLLEY POLE SERVICE

**Send for
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TODAY**

If you are interested in trolley poles of maximum strength with minimum weight and neat design, this booklet will be well worth your while.

The two different designs of "SHELBY" SEAMLESS COLD DRAWN STEEL TROLLEY POLES (Standard "A" and Standard "B") are described and the methods of testing at the mill are outlined.

Complete tables of dimensions, loads, etc., are also given. A copy may be obtained from any District Sales Office of National Tube Company without charge.

Reinforced only where the reinforcement is needed. Resiliency and lightness without sacrifice of essential strength characterize "SHELBY" SEAMLESS COLD DRAWN STEEL TROLLEY POLES

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General Sales Offices: Frick Building

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Eliminate Traffic Interruptions Due to Pole Failures

IN Long-Bell Creosoted Yellow Pine Poles electric railway companies have dependable allies in eliminating traffic delays caused by pole failures. These poles of quality combine strength and durability in full measure, with the added advantages of economy and good appearance.

The Yellow Pine of Long-Bell Poles possesses unusual breaking, bending and shearing strength because it is air-seasoned before treatment. This strength is made permanent by treating, full length, with best grade English Creosote Oil, which fortifies each pole against decay and fire. Once placed, they are there to stay! Because Long-Bell Poles are straight, smooth and uniform, they lend attractiveness to the right-of-way—an aid in gaining the approval and good will of the public.

*Further Information and Prices
will be gladly sent on request.*

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Long-Bell

Creosoted Yellow Pine Poles

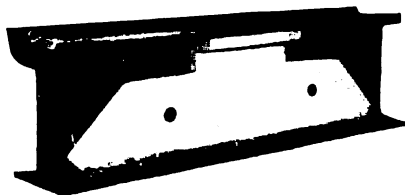
As evidence of our confidence in these poles and to identify their quality, each pole is branded "Long-Bell" five feet above the ground line. Letters below trademark show plant and year of treatment.

Long-Bell
DB

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“INDIANAPOLIS”
 Type of Welded Rail Joints
They Meet All Requirements

To Wit as Follows:

1. **Conductivity**—138%—United States Bureau of Standard Test.
2. **Strength**—Over 100% — Robert W. Hunt & Co., Testing Laboratories.
3. **Endurance**— 11 years in Service— Still Intact.
4. **Dependable**—Less than 1% Failure. When installed as directed by manufacturer.
5. **Economical**—Cost Less Than Bolted and Bonded Joints.
6. **Available**—Any road. Any quantity — from One (1) to Ten Thousand (10,000).
7. **Universal**—In use on over 125 Different Rail Sections.
8. **Endorsed**—In use on over 200 properties.



WHY?

Because —

They are Scientifically Designed
 A Special Product for a
 Specific Purpose

Completely and Perfectly Effecting the
“CONTINUOUS RAIL”

*“Perfection in Principle Proven
 in Performance”*

The Indianapolis Switch & Frog Co.

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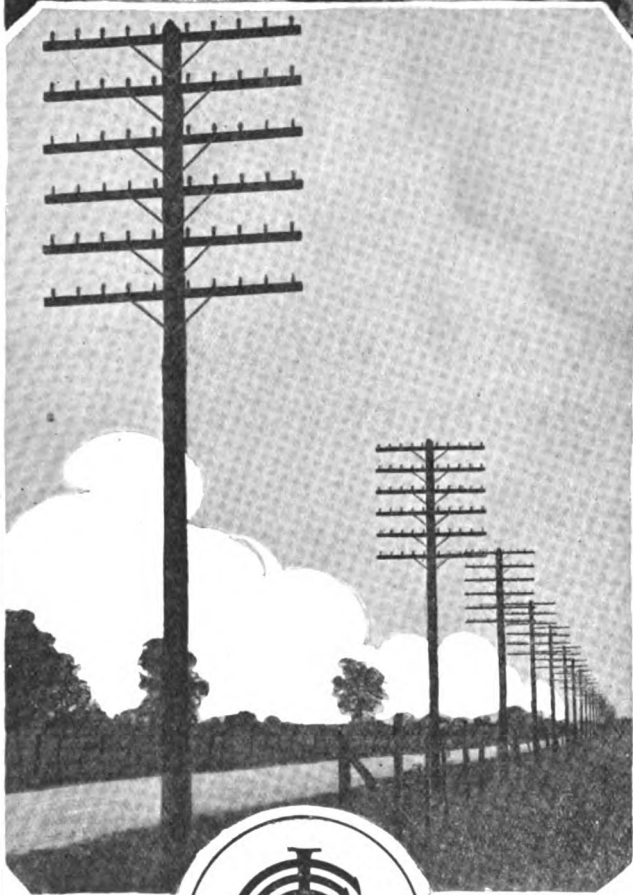
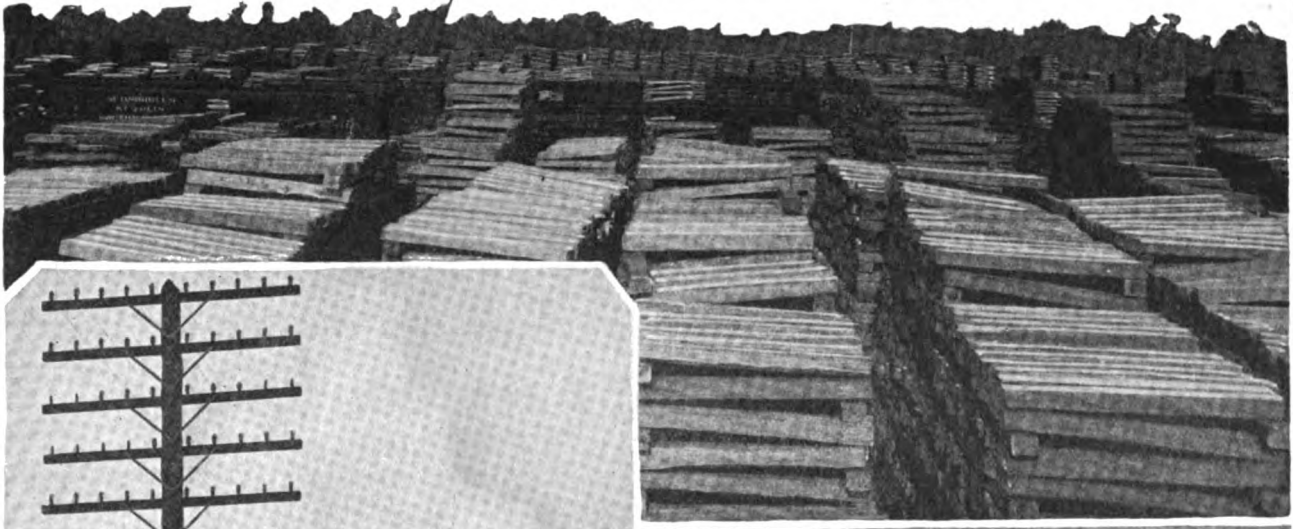
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New England Representative

International Products

High Grade Quality



Every Tie and Pole is permanently branded with the I. C. C. Co. Dating Nail. The date is in plain figures.

A Tribute to the Progressiveness and Thoroughness of International Methods

WE are doing the largest tie and pole business in the history of our company. Very gratifying to us, of course—a splendid tribute to our progressiveness, our thoroughness and our intensified efforts to render a service of grade, quality, integrity and promptness which is equalled by few.

But the large volume of business is in itself not all we are striving for—of even greater importance is the ultimate satisfaction, the long life and dependable service which International products give to the user.

The many glowing testimonials, the many commendatory remarks and large number of repeat orders we receive from our customers, are gratifying beyond the measure of dollars and cents.

Let us bid on your 1924 Tie and Pole requirements.

International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas

Beaumont, Texas

Galveston, Texas

into effect just as soon as substantially all the stock had been deposited.

It might appear at first sight that the details just recited are of primary interest to the holder of Laconia shares. As a matter of fact they are, but behind them the larger story is reflected of the increased prosperity of the equipment makers as a whole.

First Month of 1924 Fortifies Confidence in Business Outlook

Events at the turn of the year have further fortified confidence in the business outlook. Buying is still generally conservative, but conditions in most branches of business do not call for heavy inventory accumulations. Nevertheless, activity in some lines is exceeding most expectations. No less an authority than the Guaranty Trust Company, New York, points out that the most significant feature of recent prices in this country is the comparative steadiness of their average, despite a slight net decline in 1923, as compared with a more pronounced increase in the preceding year.

Another factor to which commentators on the economic trend refer is the progress made toward the resumption of customary relationships between prices, since the early reactions from the swift decline in 1920-21, represents a cumulative strengthening of the bases of economic well-being. In the absence of a sharp general movement in either direction, further correction of remaining disparities may be expected. And neither in the banking and currency situation nor in the state of industry and trade is there indication of a coming general disturbance of prices.

A revival of price inflation in consequence of the large gold supply, which was so freely predicted, has not appeared. The reserve holdings of gold, however, are greatly in excess of legal requirements, and in a sense they do make possible an inflation of bank credit. On the other hand, the administration of the banks gives no indication that the present gold stocks will be treated as if they were expected to remain indefinitely around present levels. With the persistence of a wholesome restraint upon any tendencies toward inflation of credit and prices, there is preserved also a powerful potential check upon influences tending to depress prices. When the expected redistribution of gold does begin, the reduction of stocks in this country will probably be effected gradually with a corresponding gradual reduction in the American level of commodity prices.

Automotive Car Division Formed by Brill Company

The J. G. Brill Company has formed the automotive car division, with C. J. McPherson, sales manager, to take care of the increased demand for the gasoline rail car. All renewal part business for cars of this type now in service and other types of these cars for steam railroads, ranging from the thirty-passenger six-wheel type of the Model 55, with a maximum seating capacity of fifty-five, will also be handled by this division. The company purchased the railroad motor

coach division of Service Motors, Inc., Wabash, Ind., some months ago, with exclusive rights for the production and sale of the type of gasoline rail car heretofore known as Service Model 55 Railroad Motor Coach.

Rolling Stock

Pittsburgh Railways, now that the receivership has been lifted, will spend \$3,000,000 for new rolling stock under the terms of the plan of the reorganization.

Worcester Consolidated Street Railway, Worcester, Mass., during 1923 spent \$72,000 for snow sweepers and dump cars.

Pacific Northwest Traction Company, Everett, Wash., has ordered three buses of twenty-eight-passenger capacity each, for use on the company's lines between Mount Vernon and Everett.

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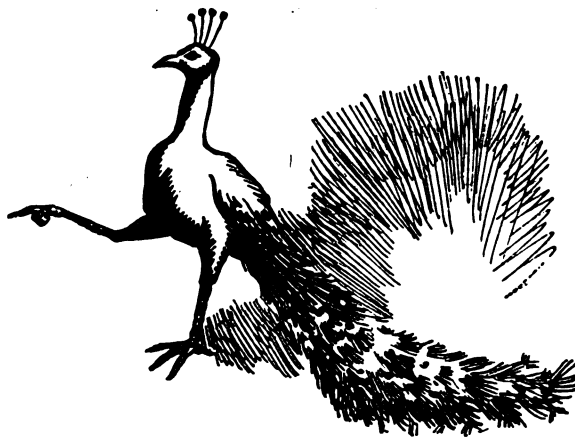
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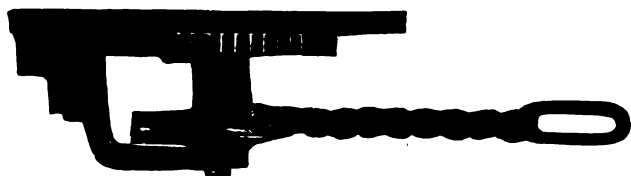
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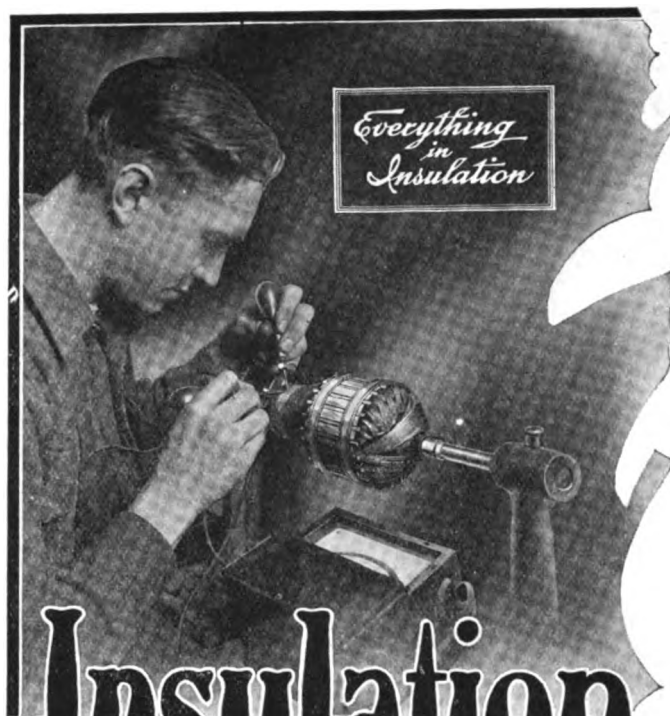
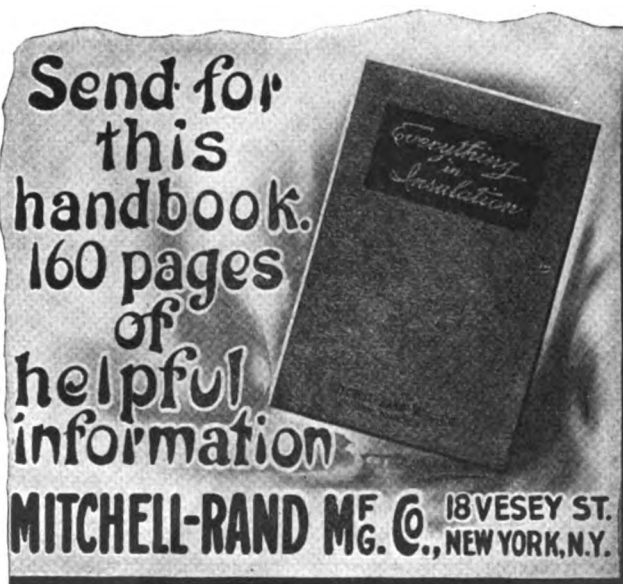
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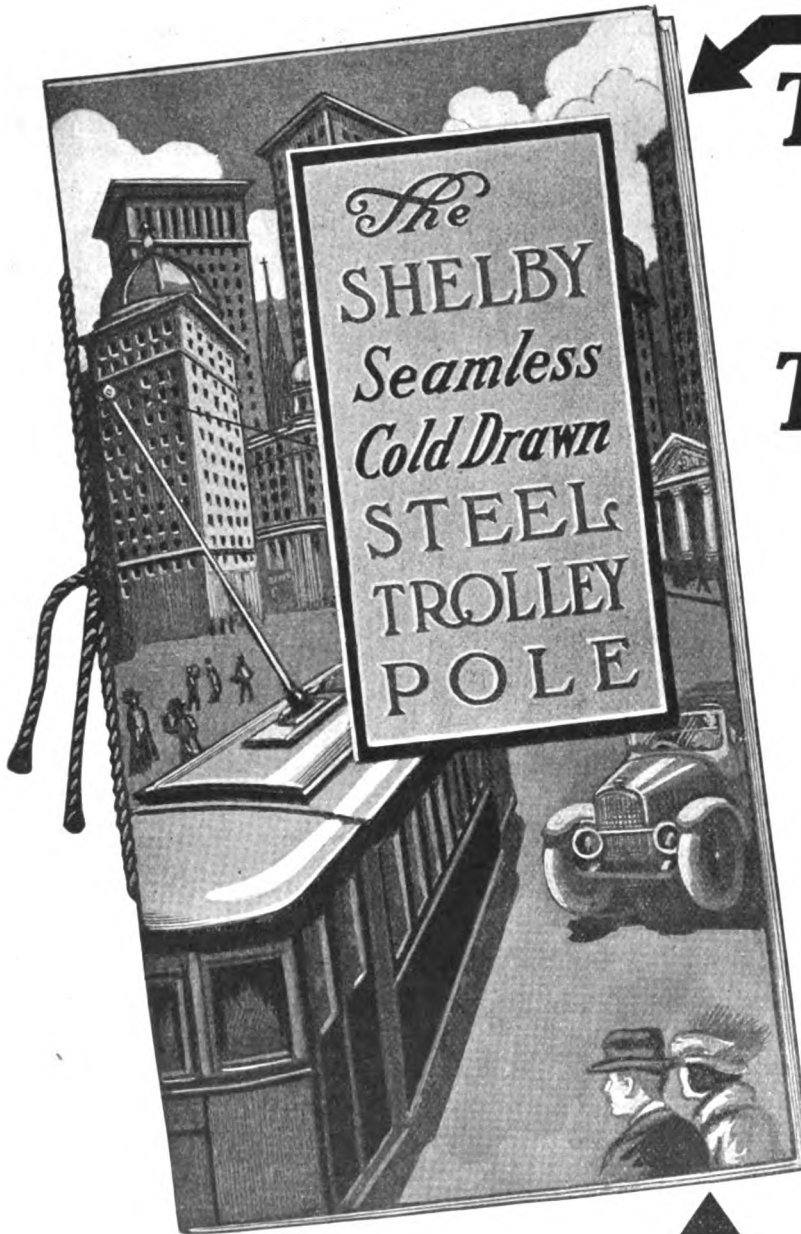
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49 Wall StreetThe Most Successful Men in the Electric Railway
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Every Week

THE P. EDWARD WISH SERVICE50 Church St.
NEW YORKStreet Railway Inspection
DETECTIVES131 State St.
BOSTONWhen writing the advertiser for information or
prices, a mention of the Electric Railway
Journal w ld be appreciated.**Insulation***for the Construction
and Repair
of
Electrical Apparatus**Failure of electrical apparatus is almost in-
variably due to the use of poor insulation
rather than to careless workmanship. When
quality difference is measured by cents, why
not select materials that are guaranteed to
pass standard tests?*



The First Step to **BETTER TROLLEY POLE SERVICE**

**Send for
Your Copy
TODAY**

If you are interested in trolley poles of maximum strength with minimum weight and neat design, this booklet will be well worth your while.

The two different designs of "SHELBY" SEAMLESS COLD DRAWN STEEL TROLLEY POLES (Standard "A" and Standard "B") are described and the methods of testing at the mill are outlined.

Complete tables of dimensions, loads, etc., are also given. A copy may be obtained from any District Sales Office of National Tube Company without charge.

Reinforced only where the reinforcement is needed. Resiliency and lightness without sacrifice of essential strength characterize "SHELBY" SEAMLESS COLD DRAWN STEEL TROLLEY POLES

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

General Sales Offices: Frick Building

DISTRICT SALES OFFICES

Atlanta Boston Chicago Denver Detroit New Orleans New York Salt Lake City Philadelphia Pittsburgh St. Louis St. Paul
PACIFIC COAST REPRESENTATIVES: U. S. Steel Products Company San Francisco Los Angeles Portland Seattle
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Eliminate Traffic Interruptions Due to Pole Failures

IN Long-Bell Creosoted Yellow Pine Poles electric railway companies have dependable allies in eliminating traffic delays caused by pole failures. These poles of quality combine strength and durability in full measure, with the added advantages of economy and good appearance.

The Yellow Pine of Long-Bell Poles possesses unusual breaking, bending and shearing strength because it is air-seasoned before treatment. This strength is made permanent by treating, full length, with best grade English Creosote Oil, which fortifies each pole against decay and fire. Once placed, they are there to stay! Because Long-Bell Poles are straight, smooth and uniform, they lend attractiveness to the right-of-way—an aid in gaining the approval and good will of the public.

*Further Information and Prices
will be gladly sent on request.*

The Long-Bell Lumber Company
1245 R. A. Long Building Kansas City, Mo.

Long-Bell

Creosoted Yellow Pine Poles

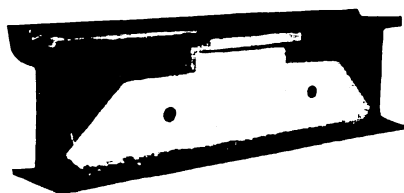
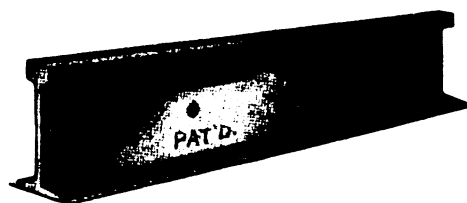
As evidence of our confidence in these poles and to identify their quality, each pole is branded "Long-Bell" five feet above the ground line. Letters below trademark show plant and year of treatment.

Long-Bell
D B

Report of Investigation of
“INDIANAPOLIS”
 Type of Welded Rail Joints
They Meet All Requirements

To Wit as Follows:

1. **Conductivity**—138%—United States Bureau of Standard Test.
2. **Strength**—Over 100% — Robert W. Hunt & Co., Testing Laboratories.
3. **Endurance**— 11 years in Service— Still Intact.
4. **Dependable**—Less than 1% Failure. When installed as directed by manufacturer.
5. **Economical**—Cost Less Than Bolted and Bonded Joints.
6. **Available**—Any road. Any quantity —from One (1) to Ten Thousand (10,000).
7. **Universal**—In use on over 125 Different Rail Sections.
8. **Endorsed**—In use on over 200 properties.



WHY?

Because —

**They are Scientifically Designed
 A Special Product for a
 Specific Purpose**

**Completely and Perfectly Effecting the
 “CONTINUOUS RAIL”**

*“Perfection in Principle Proven
 in Performance”*

The Indianapolis Switch & Frog Co.
 SPRINGFIELD, OHIO

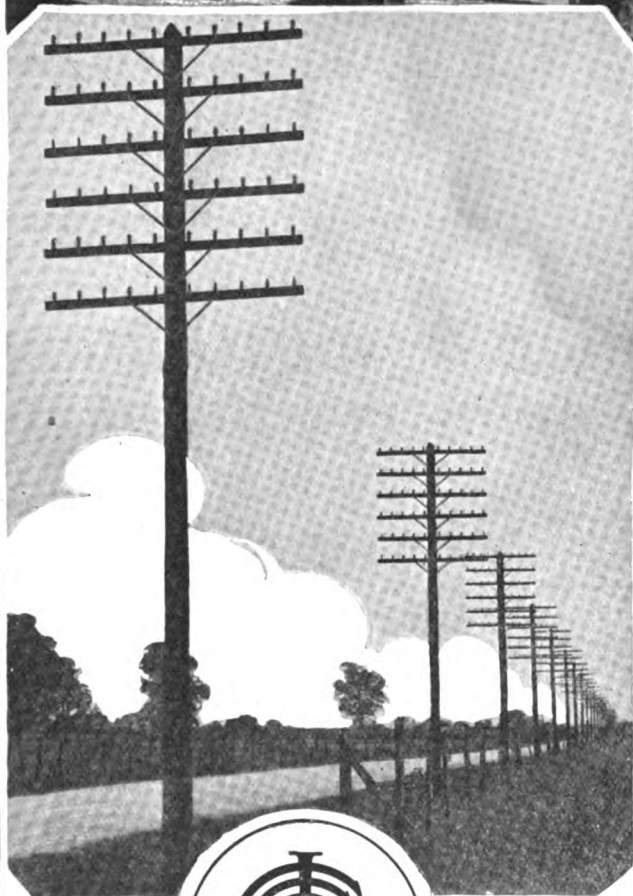
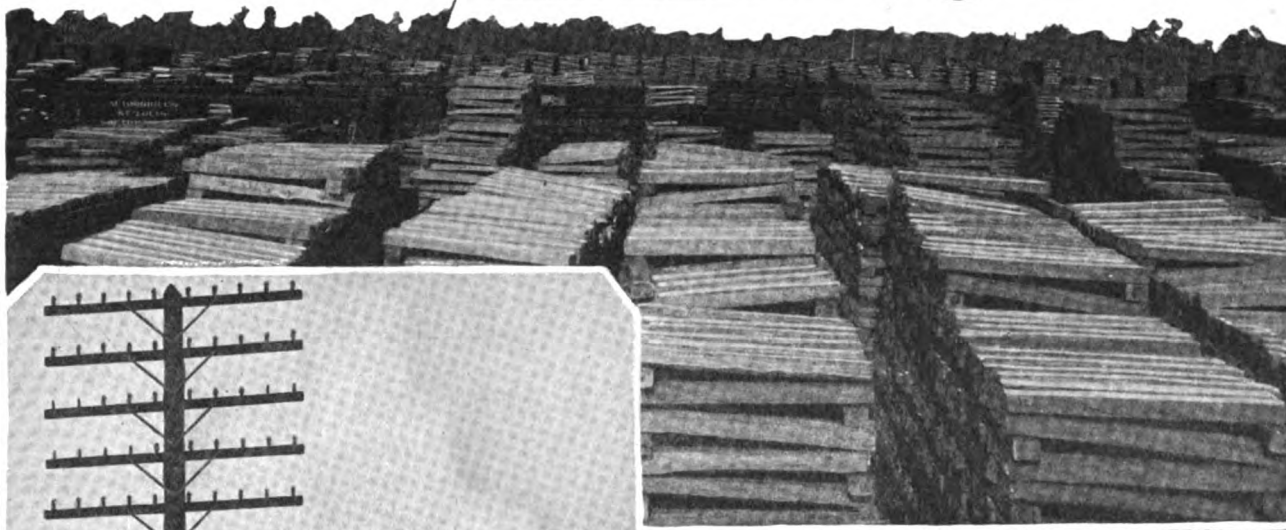
J. J. Costello

Boston, Mass.

New England Representative

International Products

High Grade Quality



Every Tie and Pole is permanently branded with the I. C. C. Co. Dating Nail. The date is in plain figures.

A Tribute to the Progressiveness and Thoroughness of International Methods

WE are doing the largest tie and pole business in the history of our company. Very gratifying to us, of course—a splendid tribute to our progressiveness, our thoroughness and our intensified efforts to render a service of grade, quality, integrity and promptness which is equalled by few.

But the large volume of business is in itself not all we are striving for—of even greater importance is the ultimate satisfaction, the long life and dependable service which International products give to the user.

The many glowing testimonials, the many commendatory remarks and large number of repeat orders we receive from our customers, are gratifying beyond the measure of dollars and cents.

Let us bid on your 1924 Tie and Pole requirements.

International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas

Beaumont, Texas

Galveston, Texas

8 Men Laid

The 1923 Committee on Way Matters of the A.E.R.A. reported at the Atlantic City convention as follows:

“It was agreed that a substitute tie should meet the following requirements:

- | | | |
|-------------------------------------|---|---|
| 1. Resiliency. | → | The fundamental principle of the DAYTON RESILIENT TIE. |
| 2. Hold rail to gage. | → | Held securely by bolts accurately located in steel cross members. |
| 3. Provide sufficient bearing area. | → | By protecting the concrete from breaking or pulverizing the Dayton Tie converts the en- |

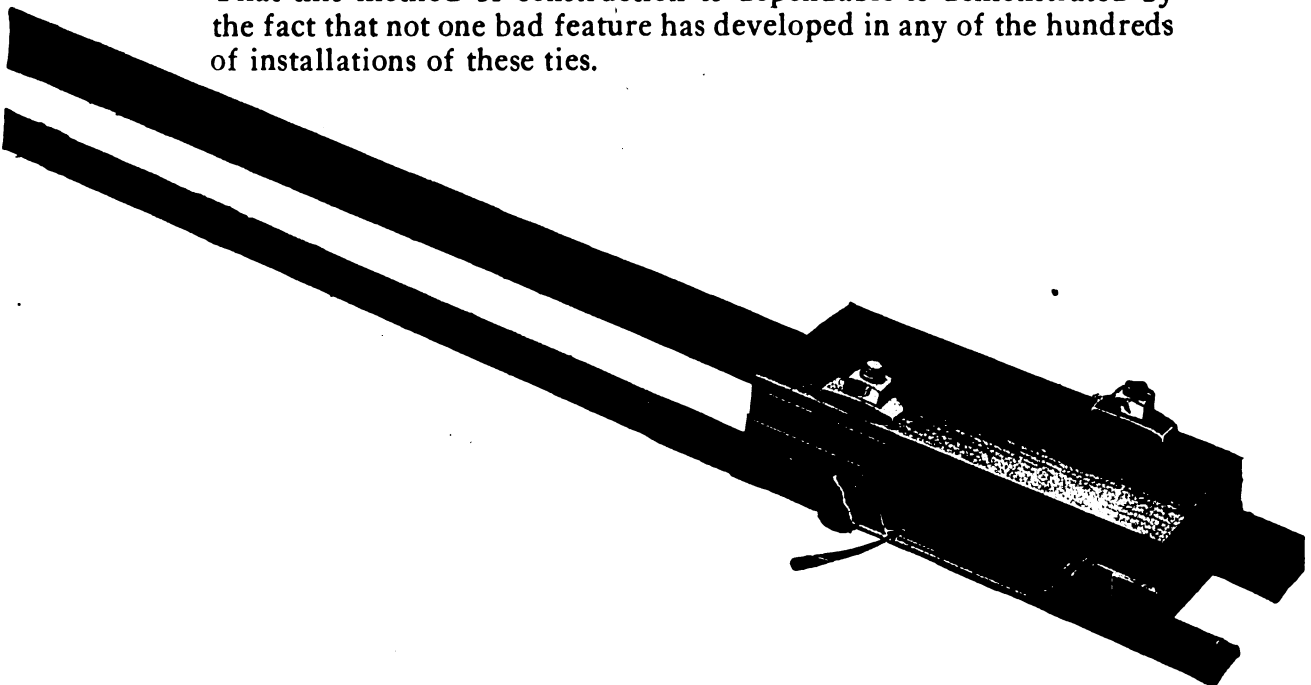
1000 Feet in a Day

The fifth point the Way Committee insists on for a tie that is to take the place of wood is that of *ease of instalment by ordinary track workers.*

The most conclusive evidence of the ability of the Dayton Resilient Tie to meet this requirement is the fact that eight ordinary track laborers, by actual test, have laid 1000 feet of Dayton Resilient track in a single day.

After locating the position of the rail a trench is then dug under each rail 18 in. wide and deep enough to allow 6 in. of concrete beneath the bottom of the ties. The rails are then placed on blocks over these trenches and the ties bolted to them. The concrete for the track foundation is then poured together with that of the paving base.

That this method of construction is dependable is demonstrated by the fact that not one bad feature has developed in any of the hundreds of installations of these ties.



Resilient TIE

THE DAYTON MECHANICAL TIE CO.
707 Commercial Bldg.
DAYTON, OHIO

79.5%

DURING the year just closed 79.5 per cent of the readers of the **ELECTRIC RAILWAY JOURNAL** have renewed their subscriptions. This is the measure used by the Audit Bureau of Circulations, and required in its reports, to indicate the value of a publication to its readers. It is a measure that can be gotten only when a paper has strictly a paid circulation.

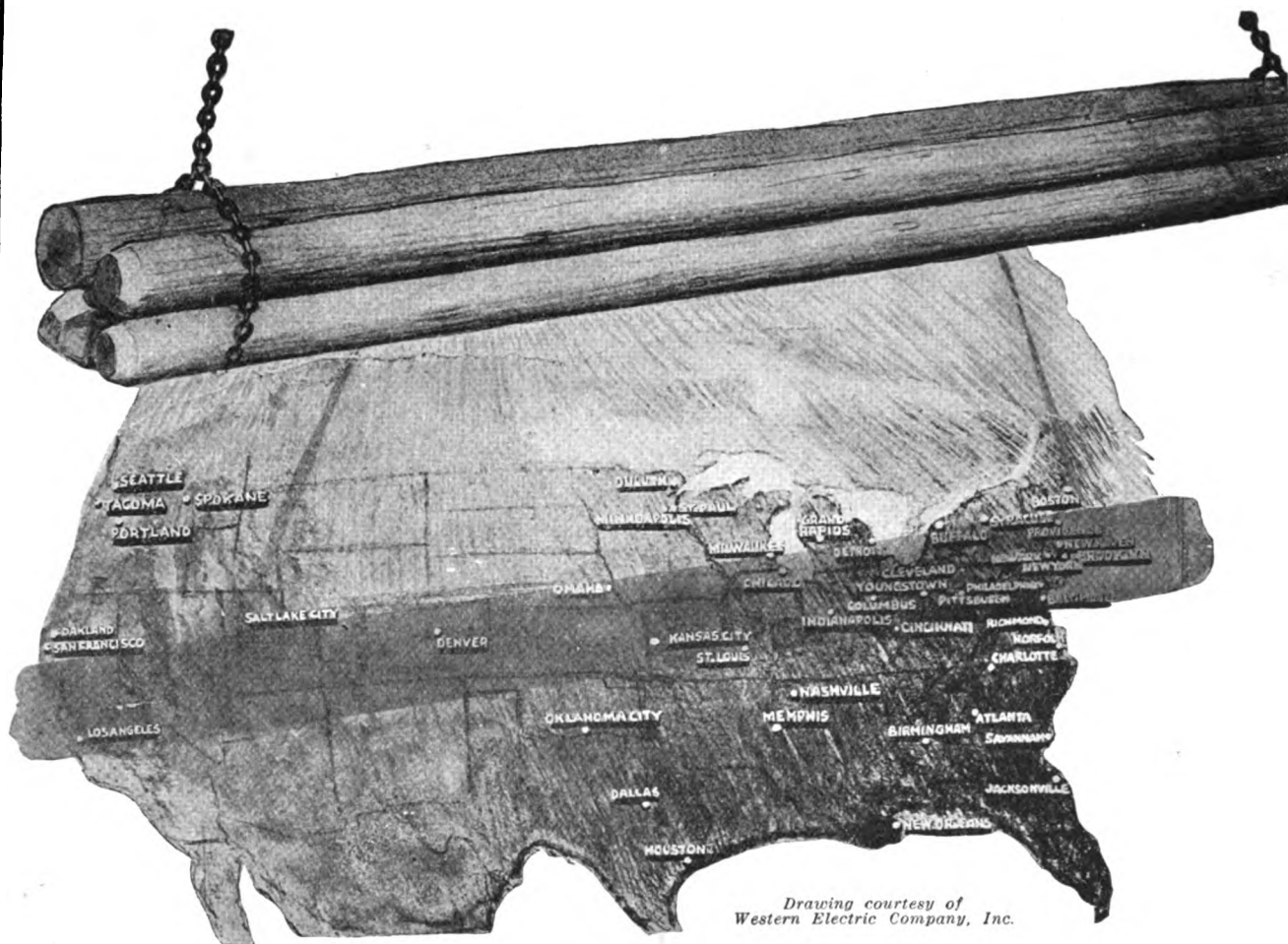
This renewal percentage of the **ELECTRIC RAILWAY JOURNAL** subscribers is the highest of the fourteen McGraw-Hill publications, and is probably not equalled by any other magazine.

Such evidence of the high regard with which electric railway men hold this paper is indeed an inspiration to the editors and the publisher to keep on striving to make it a product of exceptional interest and practical value.

Electric Railway Journal

(A McGraw-Hill Publication)

10th Avenue at 36th Street, New York



From the Stump to the Line

It's a longways from the skylines of the North and Northwest to the pole lines on the Atlantic seaboard. But the National Pole Company has eliminated distance and delays by establishing vast concentrating, treating and distribution yards at strategic points in the United States.

Today this company can supply Western Red Cedar and Northern White Cedar poles anywhere in the United States with the same promptness as other manufacturers of transmission equipment.

NATIONAL POLE COMPANY

Escanaba, Michigan

Western Electric Company

Incorporated

Offices in 47 principal cities.

Distributors.

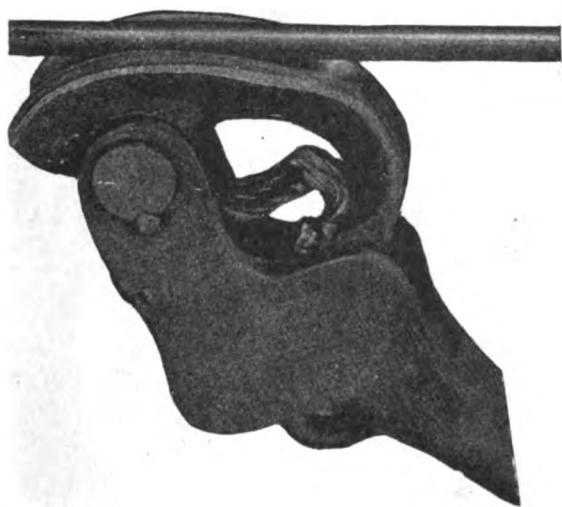


The solid, substantial
character of
COLLIER SERVICE
has placed it high
among those per-
manent organizations
recognized as
National Institutions



Barron G. Collier
INCORPORATED

Why wire wear



is less with MILLER TROLLEY SHOES

(Patented)

Impossible? No — it's a fact! Both theoretical consideration and the actual results found by roads which use them show that sliding contact shoes are really less harmful to the trolley wire.

These reasons:

1. One third less trolley tension than wheels require, reduces pressure and friction.
2. Constant contact eliminates arcing and pitting so destructive to wire where wheels are used.
3. With clinging shoes, trolleys do not jump and tear down spans.
4. Shoes slide smoothly over ears, frogs and irregularities where wheels jump and hammer.

Proved by these roads' results:

EPHRATA, LEBANON TRACTION CO.—

"Our experience has been that trolley shoes do not wear the wire as fast as wheels."

CHICAGO, NO. SHORE & MILW. R.R.—

"—condition found on inspection shows conclusively that there is less wear on the trolley wire due to the use of sliding contacts than there is due to wheels."

INTERSTATE PUBLIC SERVICE CO.—

"They do not wear the trolley wire faster."

PORTLAND-LEWISTON INTERURBAN—

Made tests which showed amazingly low wire wear where shoes were used.

Make Your Own Tests!

Only your own experience will positively satisfy you. Arrange to run one line with Miller Shoes and see the results.

MILLER TROLLEY SHOE CO.

No. 295 Columbia Road, Boston-21, Mass.

Western Representatives: Economy Electric Devices Co., 1590 Old Colony Bldg., Chicago, Ill.

—STOP!!!?

That's when you want it!

That's when the brake rigging meets its supreme test, and that's when BOYERIZED means safety—property, maybe lives, saved.

And, apart from the factor of safety, isn't it well worth while to install brake rigging that outwears ordinary parts *three to four times*? That's the *proven* resistance of BOYERIZED parts, not on special test, but in ordinary everyday service. Only BOYERIZED steel with its glossy armor-plate surface, its tough interior can show such records.

The McArthur Turnbuckle, illustrated, is but one of the BOYERIZED Family. It requires only a small hand wrench to get a grip that "stays put." One full tooth exposed at the end of each section acts as a cutter in removing ice or caked mud.



Bemis Car Truck Company

Electric Railway Supplies
Springfield, Mass.

REPRESENTATIVES:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

Other Members of the Boyerized Family

Brake Hangers	Center Bearings
Brake Levers	Side Bearings
Pedestal Gibs	Spring Post Bushings
Brake Fulcrums	Spring Posts
Bolster and Transom Chafing Plates	



The
**McArthur
Turnbuckle**
It's Boyerized!



Your Responsibility—

The moment a passenger boards a street car your responsibility for his or her safety begins.

That you appreciate the gravity of this responsibility is evidenced by your ardent advocacy of 'Safety First'.

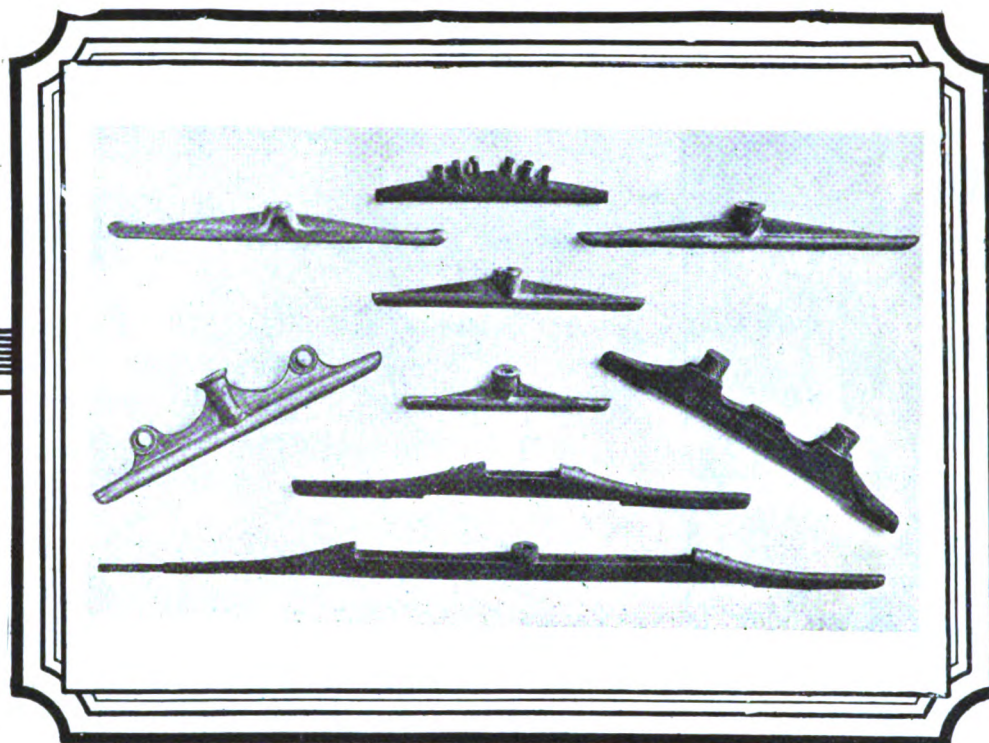
In a recent campaign to acquaint the public with their 'Safety First' policy, one of our customers laid special stress on their use of Carnegie Wheels and Axles.

An assurance of Safety is likewise an assurance of Satisfactory Service.

**Carnegie Wrought Steel Wheels and
Heat-Treated Axles**

Carnegie Steel Company

GENERAL OFFICES; CARNEGIE BUILDING
434 FIFTH AVENUE PITTSBURGH, PA.



COLUMBIA
LINE
EARS

—are made of a specially developed composition metal which enables them to withstand the repeated shocks of the wheel and pole.

Columbia line ears are built to withstand the decomposition caused by the electric arc and the clinching of the lineman's tools as he forces the wire into the groove of the ear. Weather conditions do not have any appreciable effect upon them.

All Columbia line ears are made correct to wire gauges and finished accurately to make the lineman's job an easy one. Great care is taken in machining to assure a perfect fit both in the wire groove and in tapping the threads connecting with the hangers.

3313 ATLANTIC AVE., BROOKLYN



N. Y.

CHILLED IRON WHEELS

from
50

foundries

for railway
and
street car
service

Capacity
20,000 a day

25,000,000
in service

ASSOCIATION OF MANUFACTURERS
OF CHILLED CAR WHEELS

1847 McCormick Bldg., Chicago

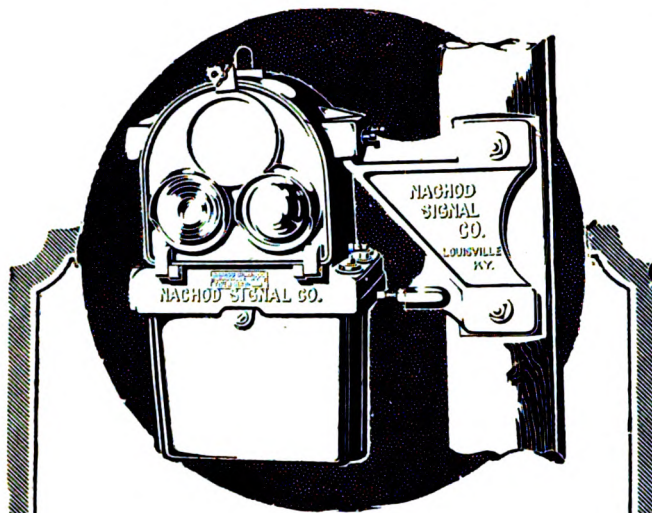
THE map above shows the location of the 50 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago, 4	Sayre, Pa.
St. Louis, 2	Berwick, Pa.
Buffalo, 4	Albany
Pittsburgh, 2	Toronto
Cleveland, 2	New Glasgow, N. S.
Amherst, N. S.	Madison, Ill.
Montreal	Huntington, W. Va.
Mieh. City, Ind.	Wilmington, Del.
Louisville	Houston, Tex.
Mt. Vernon, Ill.	Hannibal, Mo.
Ft. Wayne, Ind.	Reading, Pa.
Birmingham	Baltimore
Atlanta	Richmond, Va.
Savannah	Ft. Williams, Ont.
Boston	St. Thomas
Detroit	Hamilton
St. Paul	Ramapo, N. Y.
Kansas City, Kan.	Marshall, Tex.
Denver	Los Angeles
Tacoma	Council Bluffs
Rochester, N. Y.	Winnipeg, Man.

American Railway Association Standards

650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
750 lb. wheel for 100,000 Capacity Cars
950 lb. wheel for 140,000 Capacity Cars

*The Standard Wheel
for Seventy-Three Years*



Keep Your Cars Moving

The manager speaks: "The main thing about operating street cars, and especially on single track lines, is to keep the cars moving and not have them waste a lot of time on switches waiting for meets. This, more than anything else, exasperates and drives away passengers."

Verily, the car on the switch gathers no dividends.

Nachod Signals are invaluable with

Safety Cars

to maintain the short headways that invite the public to ride. Nachod Signals tell the motorman when the block is clear to the next passing siding. Show him when he takes the block that he has stopped an opposing movement. Permit other cars to follow him thru the block, notifying them that the block is occupied and giving each an indication of protection in entering; meanwhile holding stop signals at the other end until the block is again clear.

NACHOD SIGNALS

protect all shifting moves automatically, permitting city and interurban cars to change order at a siding.

They save time by eliminating a stop, since they work at any speed. They operate from overhead contactors at any feasible line voltage and give duplicate indications of lights and disks that cannot be mistaken under any lighting conditions.

Catalog 719 describes Nachod Signals. Write for it.

Nachod Signal Co., Inc., Louisville, Ky.
Manufacturers of Automatic Signals, Highway Crossing Bells and Automatic Headway Recorders.

NACHOD SPELLS SAFETY

ORANGEBURG FIBRE CONDUIT



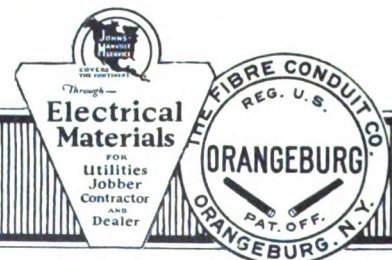
In use for thirty years

AFTER using Orangeburg Fibre Conduit, for a generation, hundreds of public utilities testify to these two facts:

1. That fibre conduit is the safest and most reliable form of underground duct line construction.
2. That Orangeburg Fibre Conduit represents the high quality of product you would expect from a company combining thirty years' experience with the most complete manufacturing facilities.

You can always depend on Orangeburg Fibre Conduit as a permanent and reliable installation.

JOHNS-MANVILLE, Inc., 294 Madison Ave. at 41st St., N. Y. C.
Branches in 61 Large Cities
For Canada: CANADIAN JOHNS-MANVILLE CO., Ltd., Toronto



**JOHNS-
MANVILLE**
SOLE SELLING AGENT

Splicers

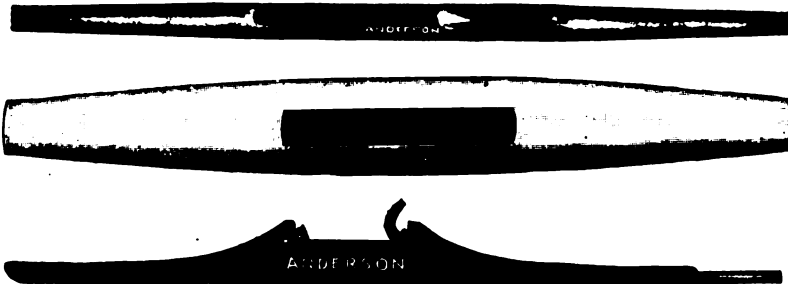
Here's a Splicing Sleeve for a quick job. It is made of hard drawn rod carefully machined and annealed. The ends are tapered to assure smooth running from wire to sleeve. Inside is tinned ready for soldering; made in lengths from 10 to 20 inches, and for all sizes of wire.

In the Emergency Splicing Sleeve the wire is held in place by steel wedges making soldering unnecessary. Lengths, 8, 10, 12 and 15 inches.

The Cleveland is another rapid form of Splicer. The wire is passed through either end. Toothed, cone-shaped, split wedges are passed over the ends of the wire and driven in; the harder the wire pulls, the tighter it becomes. Made for all sizes of wire and in one length only—20 inches.

Keep traffic moving by having a stock of Splicers always on hand ready for any emergency.

Albert & J. M. Anderson Mfg. Co.
289-305 A Street, Boston, Mass.



Branches:
New York, 135 Broadway; Philadelphia, 429
Real Estate Trust Bldg.; Chicago, 105 So.
Dearborn St.; London, 12 Moor Lane E. C. 2

Trade



Mark

IRVINGTON VARNISHED Cambric



Seven factors of Quality

High Dielectric Strength Non-Hygrosopic
High Resistance Heat Resisting
Flexibility Chemically Neutral
Maximum Elasticity

The Copper and Steel entering into the manufacture of motors, transformers, turbo generators, etc., never wear out. Oil is renewed, but the only factor that can deteriorate is the insulation, and that in many cases has been good for the life of the equipment where Irvington Varnished Cambric was used. It has stood and will stand the test of time. That is why the large manufacturers insist on Irvington. Ask for samples and prices.

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.

Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electric Supply Co., St. Louis
E. M. Wolcott, Rochester

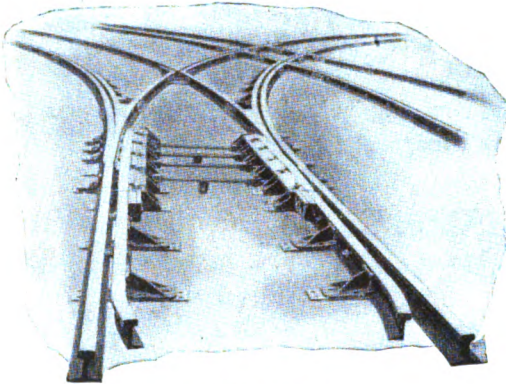
L. L. Fleig & Co., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles
F. G. Scofield, Toronto

TAYLOR-WHARTON IRON & STEEL CO.

TIOGA STEEL & IRON CO.

WM WHARTON JR. & CO. INC.

PHILADELPHIA ROLL & MACHINE CO.



Tisco Manganese Steel Housed Point Switch

Type "M.H.S." Manganese Steel Housed Point Switch used in subways and elevated roads in several large cities. The points of the switches are cast of Tisco Manganese Steel; the stock rails are offset to receive and protect the switch point. This type switch has been highly commended for meeting severe conditions. Elevated and subway systems require special work of unusual wear-resisting qualities, and Tisco Manganese Steel Products have the necessary characteristics to meet every demand.

Railway properties seeking switches, frogs, crossings and other trackwork that will stand up under severest traffic will find it in the interest of low maintenance to adopt Tisco Manganese Steel Trackwork.

WM. WHARTON JR. & CO., INC.
Easton, Pa.

Taylor-Wharton Iron & Steel Co.
Plant at High Bridge, N. J.
Manganese Steel
Wearing Parts

Wm. Wharton Jr. & Co.
Plant at Easton, Pa.
Special Trackwork
Cylinders for Gases

Tioga Steel & Iron Co.
Plant at Philadelphia, Pa.
Forgings
Hammered and Pressed

Phila. Roll & Machine Co.
Plant at Philadelphia, Pa.
Rolls and Rolling
Mill Machinery



***"We are satisfied
that this is the only
commercially practicable
method of
eliminating the joint"***

San Antonio Public Service Co.

A clear cut opinion of the Thermit Insert Rail Weld, based, not on a hasty decision, nor on isolated experiments, but on practical experience with Thermit welds dating from 1913. Incidentally, the first welds made on this property are still in good condition today.

And such a record is by no means unusual. The Thermit Insert Rail Weld has long passed the experimental stage. It eliminates the rail joint entirely, with all attendant bonding, bolts, and fishplates. Electrical conductivity is fully equal to that of the unbroken rail; while if anything the joint is mechanically stronger. Add to this the fact that Thermit Welds cost little, if any, more than less permanent methods.

Let us discuss Thermit Welding as applicable to your trackwork. An exhaustive new booklet No. 1532, on Thermit Rail Welding, will be sent on request. Write for it now.

The THERMIT INSERT RAIL WELD

Metal & Thermit Corporation

120 Broadway, New York



PITTSBURGH

CHICAGO

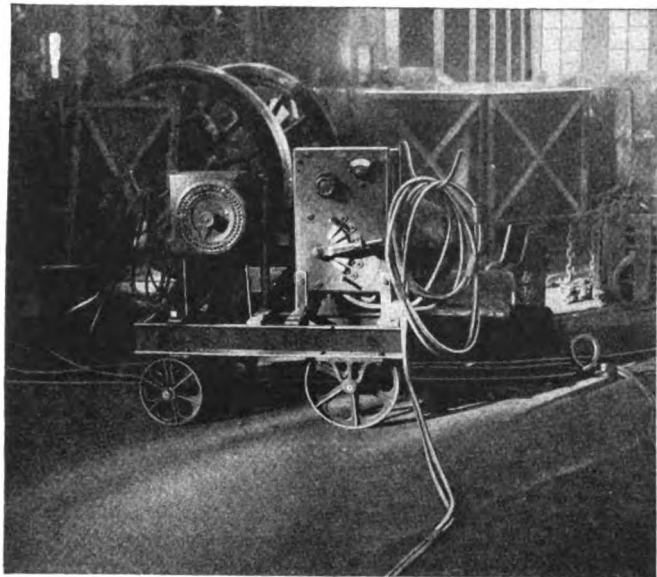
BOSTON

S. SAN FRANCISCO

TORONTO



ROME WIRE



Super Service Cord and Cable For the Shop

The photograph above was taken in the shop of a prominent railroad and shows one of their uses of Super Service Cable. They have standardized on these vulcanized rubber jacket cords and cables, having found them the most enduring for shop work. Super Service will save time, money, and worry for you, too!

Super Service in All Sizes

Super Service Cord and Cable is made in all types and sizes for railroad work from portable lamp cords to the heaviest welding cable. Write for complete descriptive and illustrated booklet, with capacities and prices.

Write to Department B 2

ROME WIRE COMPANY

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ROME, N. Y.

Diamond Mills:
BUFFALO, N. Y.

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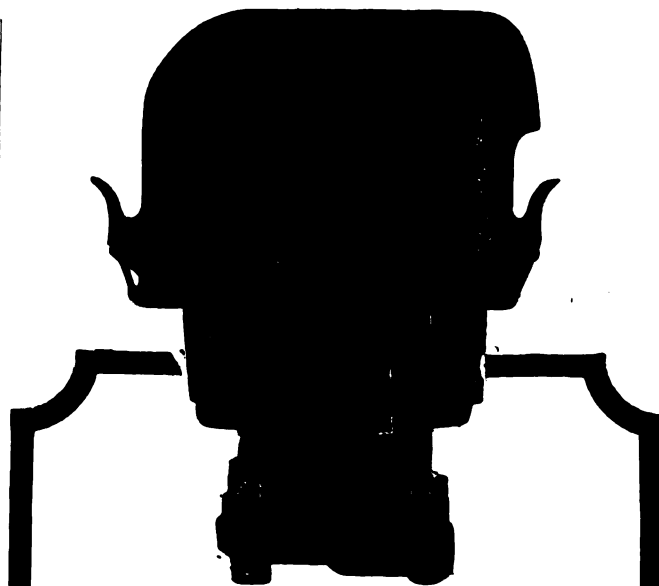
2158-L



Send for a
sample and
make your
own tests



WIRE-ROME



ALLIS-CHALMERS

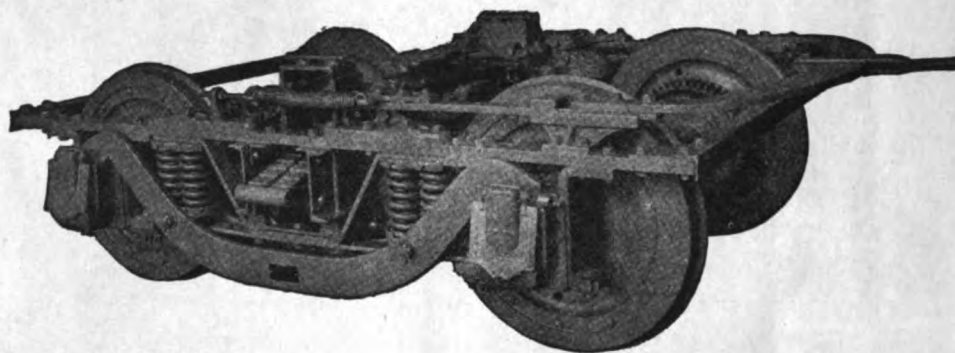
Type OB Governor for Air Brake Equipment

The dependability of this governor has led to its adoption by railways and other users of air compressors.

Send for Bulletin 1091

ALLIS-CHALMERS
MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN. U.S.A.

Baldwin Improved Motor Trucks for Electric Interurban and Street Railway Service



Baldwin Type "A" Truck used on the Osaka Electric Railway and also on the Osaka Tetsudo Railway of Japan. Similar Trucks are used on many American and Foreign Electric Railways.

BALDWIN Electric Motor Trucks are designed and built with the same engineering skill and excellence of workmanship as are Baldwin Locomotives.

We build trucks to meet the most severe conditions of high speed electric interurban and street railways; for use under motor cars on electrified

sections of steam lines; for double truck electric locomotives used in switching and local freight service; for the requirements of city and interurban electric freight and express service.

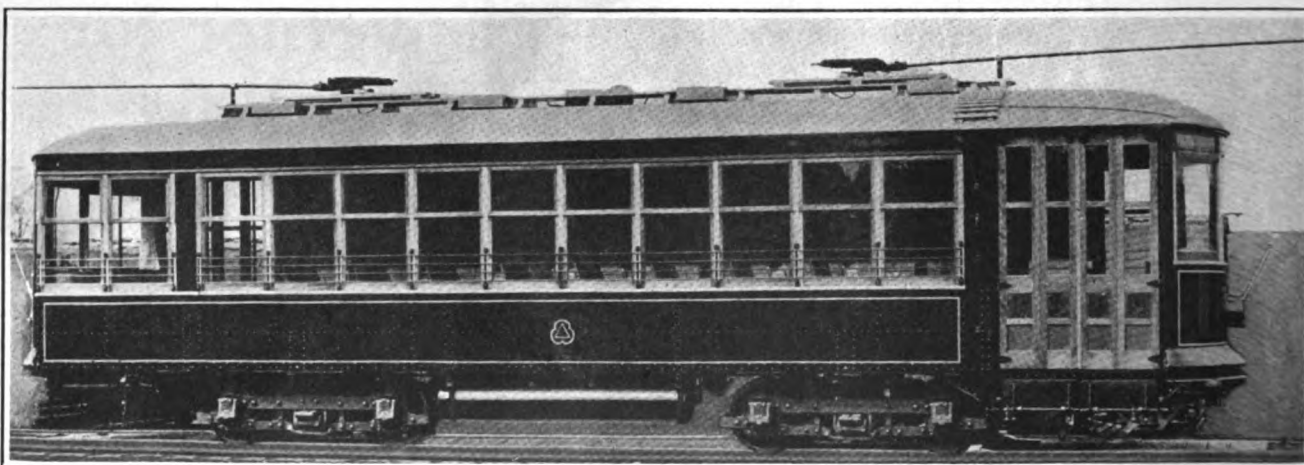
For simplicity, strength, low cost of maintenance and perfect riding qualities, Baldwin Trucks cannot be excelled.

*Baldwin representatives in all principal countries of the world
Detailed information upon request*

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A.

Cable Address, "Baldwin, Philadelphia"



Car Construction

Birney safety cars, double-truck, one-man safeties, larger city cars and highest grade interurbans.

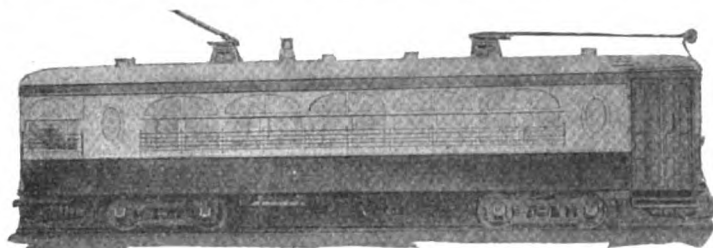
Specialties

Sash, Doors, Interior Finish and Framing
Curtains, Ventilators and Car Trimmings,
Brakes, Gongs, Door and Step Mechanisms.

All it takes is one trial to be convinced of the superior grade of materials, workmanship and attention put into every car and every piece of car equipment which comes out of our shop.

"We satisfy"—try us!

Perley A. Thomas Car Works
HIGH POINT, N. C.



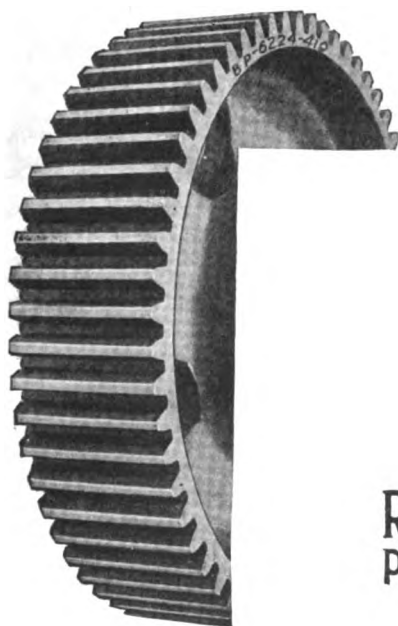
"QUALITY" CARS

City Cars—Interurbans—Buses
Trucks—Forgings—Seats—General Supplies

St. Louis Car Company

St. Louis, Mo.

"The Birthplace of the Safety Car"



Nuttall

**Can You Get This Guarantee With
Any Other Gears, At Any Price?**

We guarantee Nuttall BP Gears to last four times as long as untreated gears in the same service, and that means a cost saving of about 70%. If they are Helical Gears, they will last still longer and greatly reduce motor maintenance.

Do you want a trial set?

R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA



All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

The Baker Wood Preserving Company CREOSOTERS

Washington Court House, Ohio

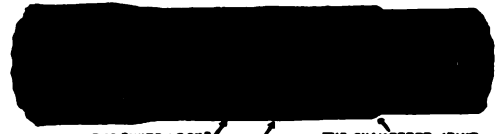
Cross Ties Bridge Timbers
Lumber Posts
Piling

Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

ELRECO TUBULAR POLES



COMBINE

Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street



AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE
AND CABLE

PAPER INSULATED
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AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 116 Federal; Chicago, 112 W. Adams;
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Shaw Lightning Arresters

Standard in the Electric Industries
for 35 years

Henry M. Shaw

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Trade Mark

Chapman Automatic Signals

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Wires, Cables, Cable Accessories
Superior quality, economical prices
Standard Underground Cable Co.
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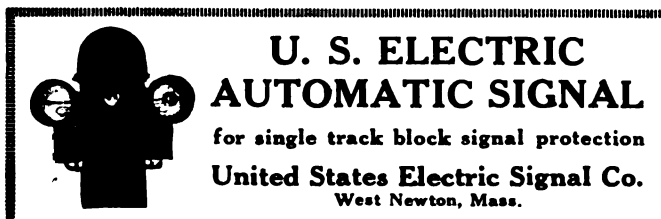


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MINING COMPANY
Conway Building, Chicago, Ill.

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INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY



U. S. ELECTRIC
AUTOMATIC SIGNAL

for single track block signal protection

United States Electric Signal Co.
West Newton, Mass.



Ramapo Automatic
Return Switch
Stands
for Passing
Sidings



RACOR Tee Rail
Special Work.
Manganese
Construction

GENERAL OFFICES: HILLBURN, NEW YORK
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Special Track Equipment and Layouts
of all kinds

THE BUDA COMPANY
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High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
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Adapted to all types
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Proven by
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CROWN
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AIMco Electric Railway
Automatic
Signals

for Accessibility
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Series Type
Arc Welding and Bonding Outfit
Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage
The Electric Railway Improvement Co.
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METAL SAFETY CROSS TIES

Eliminate from track assemblage all spikes, plates, anchors, braces,
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Peirce Sign Hangers For Span Wires

The hinged joint keeps the sign in position
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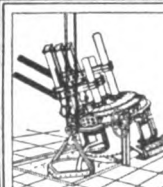


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Field Coils have better protection when wound with
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**Moore Rapid
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Ten Standard Sizes 1/2 to 24 Tons Capacity
Most Rapid and efficient for making
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A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

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HIGH SPEED MONEY CHANGERS

1924 model
—without
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Supplied in
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tube combinations

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Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

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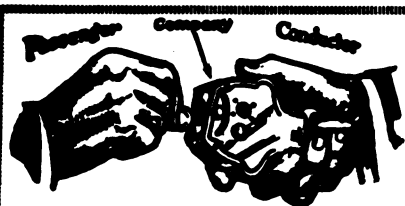
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By the
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are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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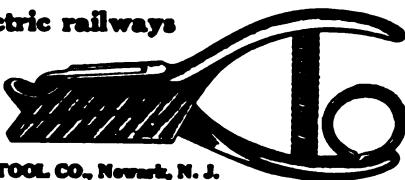
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is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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They indicate and record the exact amount of each transaction. They place the sale of transportation on a strictly business basis.

We manufacture Indicating and Recording Fare Registers, Receipt Issuing Taximeters, and Fare Boxes.

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Simple and accurate as the International method has always been the modern tendency in street railway practice toward automatic operation is reflected in the newest type registers, equipped with electric Backs, removing the last drag on the platform worker, and contributing to the quicker handling of traffic.

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Exclusive selling agents for **HEEREN ENAMEL BADGES.**

The International Register Co.
15 South Throop Street, Chicago, Illinois



CLEVELAND FARE BOXES

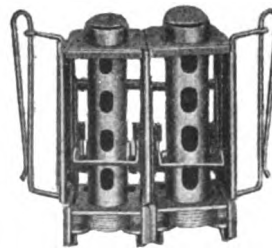
always

**Fit the Fare and
Fare Collection System**

The Cleveland Fare Box Co.
Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd.
Preston, Ontario

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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Heywood-Wakefield CAR SEATS

of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.

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Offices at New York, Chicago, San Francisco



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The Stop Light for street cars. Operates from brake system. Details on request.

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"HONEYCOMB" AND "ROUND JET" VENTILATORS for Monitor and Arch Roof Cars, and all classes of buildings; also **ELECTRIC THERMOMETER CONTROL** of Car Temperatures.

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Chicago, Ill.

Write for
Catalogue

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"TAYLOR-MADE" TRUCKS

Have proven their **SUPERIORITY** for over 30 YEARS, for all types of electric railway cars.

Taylor R. H. Double Truck especially designed for **PETER WITT** Type Cars.

TAYLOR STRAIGHT ACTION BRAKES

Have made a record for

Safety, Low Maintenance Cost and Successful Brake Operation

In the specifications for your new cars include

"Taylor-Made" Trucks Equipped with Taylor Straight Action Brakes

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ESTABLISHED 1892.

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have always been made of entirely new metal, which accounts for their long life **WITHOUT INJURY TO THE WIRE**. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the **LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD**.



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Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

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If you are not familiar with the quality you will be surprised at its **ENDURANCE and ECONOMY**.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY

Manufacturers of bell, signal and other cords.

Newtonville, Massachusetts



*Defective Wheels
Corrected While They Run*

WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in service. Abrasive blocks in various sections correct flattening or wear on any part of flange or tread. Write for booklet.

Wheel Truing Brake Shoe Co.
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Trade Mark—Wheel Truing Brake Shoe



We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC
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Tulc, Inc., Eastern Representative,
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SHOCKS

have little effect on

AJAX CHECK PLATES

*because
these plates are made from
Ajax Perfecto Bronze*

*The strongest and toughest metal on the market. They will bend
before they will break and give longest possible service.*

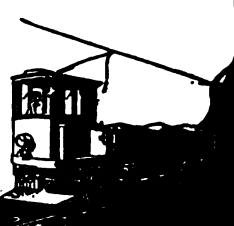
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Established 1880
Philadelphia, Pa.

NEW YORK CHICAGO BOSTON CLEVELAND

The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

**The Differential
Steel Car Co.**
Findlay, Ohio





OHMER FARE REGISTERS

They indicate and record the exact amount of each transaction. They place the sale of transportation on a strictly business basis.

We manufacture Indicating and Recording Fare Registers, Receipt Issuing Taximeters, and Fare Boxes.

OHMER FARE REGISTER CO.
Dayton, Ohio

Fare Registration on a Modern Basis



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Registers made in various types to meet the requirements of service on Electric Railways.

Exclusive selling agents for **HEEREN ENAMEL BADGES.**

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CLEVELAND FARE BOXES

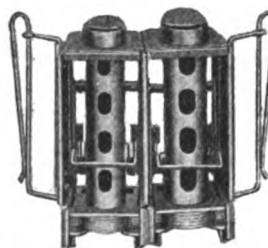
always

Fit the Fare and
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JOHNSON Universal Changer



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The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

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Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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Heywood-Wakefield CAR SEATS

of pressed Steel for all Classes of Passenger Service. Ration for covering seats and for snow sweepers.

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Factory at Wakefield, Mass.

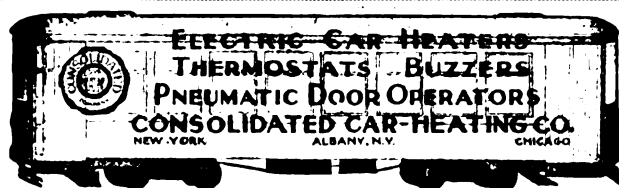
Office at New York, Chicago, San Francisco



"OSKELITE"

The Stop Light for street cars. Operates from brake system. Details on request.

The Oskel Equipment Co.
940 McCormick Bldg., Chicago, Ill.



RAILWAY UTILITY COMPANY

Sole Manufacturers

"HONEYCOMB" AND "ROUND JET" VENTILATORS for Monitor and Arch Roof Cars, and all classes of buildings; also ELECTRIC THERMOMETER CONTROL of Car Temperatures.

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"TAYLOR-MADE" TRUCKS

Have proven their **SUPERIORITY** for over 30 YEARS, for all types of electric railway cars.
Taylor R. H. Double Truck especially designed for PETER WITT Type Cars.

TAYLOR STRAIGHT ACTION BRAKES

Have made a record for

Safety, Low Maintenance Cost and Successful Brake Operation

In the specifications for your new cars include

"Taylor-Made" Trucks Equipped with Taylor Straight Action Brakes

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ESTABLISHED 1892.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life **WITHOUT INJURY TO THE WIRE**. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the **LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD**.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

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If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY**.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts



*Defective Wheels
Corrected While They Run*

WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in service. Abrasive blocks in various sections correct flattening or wear on any part of flange or tread. Write for booklet.

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We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC
on your equipment

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SHOCKS

have little effect on

AJAX CHECK PLATES

*because
these plates are made from
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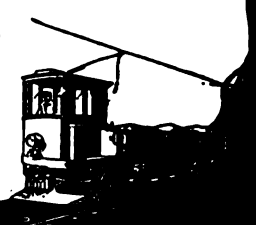
The strongest and toughest metal on the market. They will bend before they will break and give longest possible service.

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Established 1880
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The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.



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You're having brush trouble

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USE LE CARBONE CARBON BRUSHES

They talk for themselves

**COST MORE PER BRUSH
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Diamond "S" Steel Back is the Best Type



**Standard
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**SAFETY
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THORNTON

The trolley wheel with the high
mileage side bearing

Thornton Wheels with Thornton side
bearings are unusually long-lived, re-
quire less lubrication, and less main-
tenance. They are free from vibra-
tion and noiseless. No bushings. *In-
vestigate them.*

Bearings make fifty thousand or more miles

Send for descriptive circular

Thornton Trolley Wheel Co.,
Incorporated
Ashland, Kentucky



**STUCKI
SIDE
BEARINGS**

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.



Gets Every Fare
**PEREY TURNSTILES
or PASSIMETERS**

Use them in your Prepayment Areas and
Street Cars

Perey Manufacturing Co., Inc.
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N-L VENTILATORS

Write for new catalogue
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THE NICHOLS-LINTERN COMPANY

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N-L Products manufactured and sold in Canada by
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The Consolidated Car Fender Co., Providence, R. I.
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INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.
Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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Rates for larger spaces, or yearly rates, on request.
An advertising inch is measured vertically on one column, 2 columns—30 inches—to a page.

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ROADMASTER wanted for electric road in the East. Must be thoroughly efficient in the handling of material and labor and competent in the maintenance of city and interurban track. State experience, salary expected and when available. P-648, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SALES engineer wanted, familiar with steam and street railway special track work, capable of securing field data for the manufacture of same. Must have had experience with manufacturer of special track work. State experience, approximate salary, age and education. P-643, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

EMPLOYMENT and personnel man. Now with large company operating surface and elevated lines. Married and in his thirties. Willing to locate anywhere. PW-649, Elec. Ry. Jour., Real Estate Trust Bldg., Phila., Pa.

SUPERINTENDENT, nine years' railway and some lighting experience, desires correspondence with managers wishing the services of a capable, efficient, energetic, official. Will consider position in West Indies. PW-642, Electric Railway Journal, 10th Ave. at 36th St., New York.

WANTED position with electric railway company. Young man 29 years old, with 9 years' of valuable experience in transportation and mechanical departments. PW-650, Elec. Ry. Jour., 10th Ave. at 36th St., New York.

RECEIVER'S SALE

The Ohio River Electric Railway and Power Company

is to be sold by virtue of a decree of foreclosure and order of sale made and entered by the District Court of the United States for the Southern District of Ohio, Eastern Division, by Harry Hartwell, Special Master appointed for that purpose.

The property will be sold at public auction to the highest bidder at the door of the County Court House, Meigs County, Ohio, in the village of Pomeroy at 12 o'clock, noon, central standard time, on the 26th day of February, 1924.

The property to be sold comprises about 13 miles of railroad built about 20 years ago and operates between the K. & M. R.R. station at Hobson, Ohio, through the villages of Middleport, Pomeroy, Syracuse and Racine, together with all rails, poles, wires, cars, electric locomotives and other equipment and supplies on hand for the operation of the property. There is also to be included in the sale, the outstanding common stock of the Pomeroy and Middleport Electric Company, a subsidiary which supplies electric current for light, heat and power purposes in the Village of Pomeroy and territory immediately to the east thereof. Fuller information and details may be secured at the office of Harry Hartwell, Receiver, Pomeroy, or at his office in New York, Room 1034, 120 Broadway.

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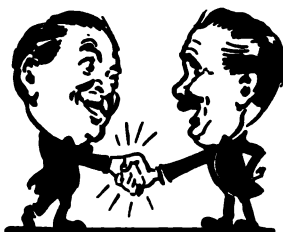
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G-23

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advertising, Street Car
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Anchors, Guy
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Ohio Brass Co.
Westinghouse Elec. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch
Stand
Ramapo Ajax Corp.
Automatic Safety Switch
Stand
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
Johnson & Co., J. R.
St. Louis Car Co.
Axles, Bus
Standard Steel Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Babbitt Metal
Ajax Metal Co.
Saddles and Buttons
Elec. Service Supplies Co.
International Register Co.
The
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National Carbon Co.
Nichols-Lantern Co.
Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
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A. Gilbert & Sons, B. F. Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Bearings, Center and Roller
Side
Baldwin Locomotive Wks.
Stucki Co., A.
Bells and Gongs
Brill Co., The J. G.
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Consolidated Car Heating
Co.
Elec. Service Supplies Co.
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Railway Track-work Co.
Roller Tubes
Nat'l Tube Co.
Rollers
Babcock & Wilcox Co., The
Band Textures
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog
Co.
Ohio Brass Co.
Railway Track-work Co.
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Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.
Brackets and Cross Arms
(See also Poles, Ties, Posts
etc.)
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Bates Expanded Steel Truss
Co.
Elec. Ry. Equipment Co.
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Hubbard & Co.
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Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Brake Shoe & Fdry.
Co.
Barbour-Stockwell Co.
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Brill Co., The J. G.
Columbia M. W. & M. I. Co.
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Wheel Truing Brake Shoe
Co.
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Brake Parts
Allis-Chalmers Mfg. Co.

Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
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Johns-Manville, Inc.
National Brakes Co.
Safety Car Devices
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.
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General Electric Co.
Jeandron, W. J.
Le Carbons Co.
Morganite Brush Co., Inc.
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Westinghouse Elec. & M. Co.
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Anderson Mfg. Co., A. &
J. M.
Columbia M. W. & M. I. Co.
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Bunkers, Coal
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bushings, Case Hardened and
Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Cables
(See Wires and Cables)
Calculating Machines
W. A. Morschhauser
Cambrie Tapes, Yellow &
Black Varnish
Irvington Varnish & Ins. Co.
Cambrie Yellow & Black
Varnish
Mica Insulator Co.
Carbon Brushes
(See Brushes, Carbon)
Car Lighting Apparatus
Elec. Service Supplies Co.
Car Panel Safety Switches
Consolidated Car Heating
Co.
Westinghouse Elec. & M. Co.
Cars, Dump
Differential Steel Car Co.,
Inc.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Cars, Gas Rail
St. Louis Car Co.
Cars, Passenger, Freight
Express, etc.
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Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Wks., Perley A.
Watson Mfg. Co.
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Electric Equipment Co.
Transit Equipment Co.
Cars, Self-Propelled
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or Copper
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Wm.
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Amer. Brake Shoe & Fdry.
Co.
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Columbia M. W. & M. I. Co.
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Trolley
Earll, C. I.
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Wood Co., Chas. N.
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Change Carriers
Cleveland Fare Box Co.
Galef, J. L.
Circuit Breakers
General Electric Co.
Westinghouse Elec. & M. Co.

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Wires and Cables
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Elec. Ry. Equipment Co.
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Hubbard & Co.
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Sweepers and Brooms)
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McGuire-Cummings Mfg. Co.
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Coal and Ash Handling
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Machines
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Galef, J. L.
Coin Wrappers
Cleveland Fare Box Co.
Galef, J. L.
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Compressors, Gas
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Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.
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Westinghouse Elec. & M. Co.
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General Electric Co.
Westinghouse Elec. & M. Co.
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Rome Wire Co.
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The
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Cranes Locomotive
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Universal Crane Co.
Cranes Portable
Universal Crane Co.
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Ramapo Ajax Corp.
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International Steel Tie Co.
Crossing Frogs and Switches
Ramapo Ajax Corp.
Wharton, Jr. & Co., Inc., Wm.
Crossings, Manganese
Indianapolis Switch & Frog
Co.
Ramapo Ajax Corp.
Crossing Signals (See Signal
Systems, Highway Cross-
ing)
Crossings, Track, (See Track,
Special Work)
Crossings, Trolley
Ohio Brass Co.
Crushers, Rock
Allis-Chalmers Mfg. Co.
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Indianapolis Switch & Frog
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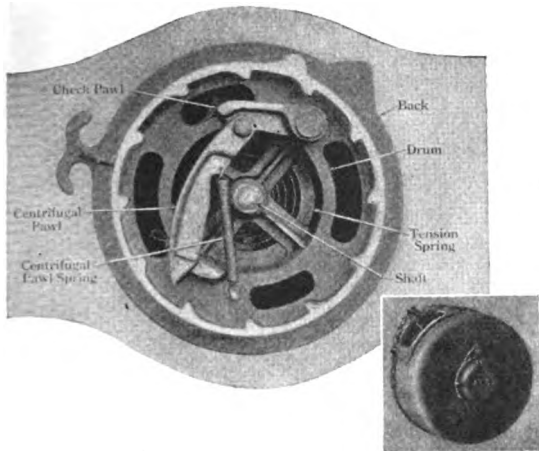
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706-C

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- Insulating Varnishes**
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Insulation, Slot
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Insulator Pins
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Hubbard & Co.
- Insulators (See also Line Material)**
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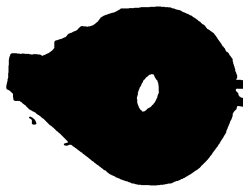
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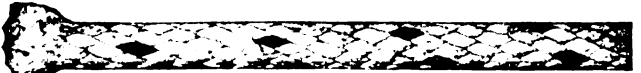
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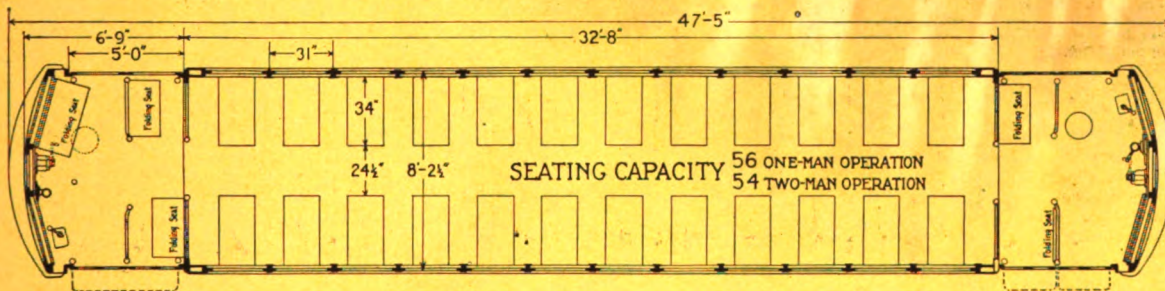
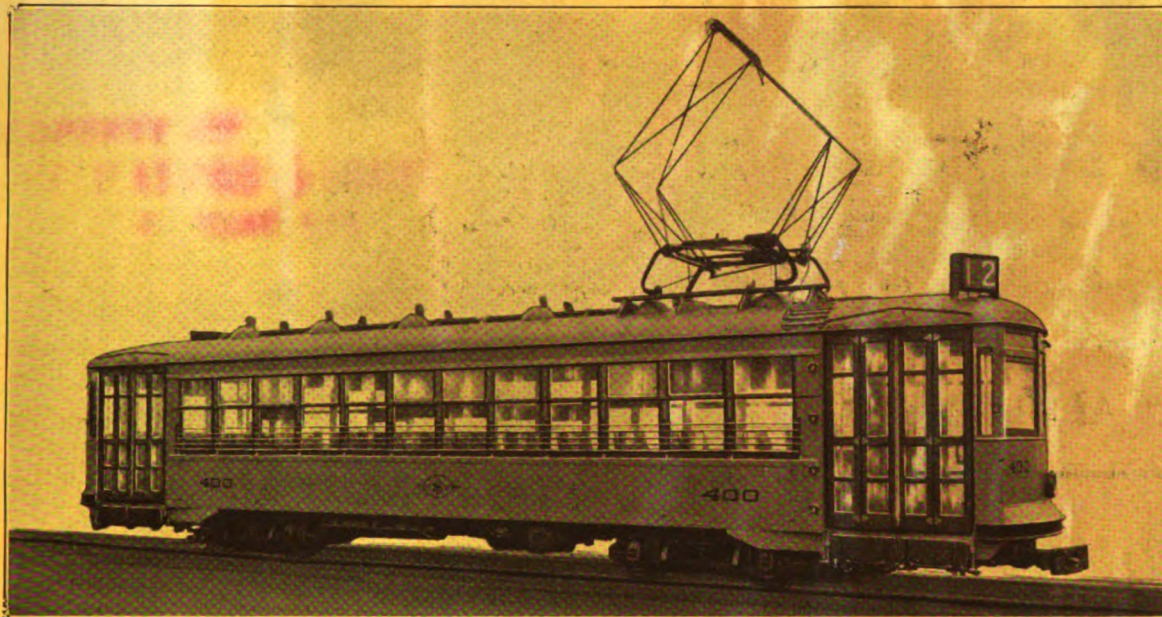
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Old Colony Bldg., Chicago

CARL W. STOCKS
Associate Editor

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Published weekly. Entered as second-class matter, June 23, 1903, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.



1924

Cable Address: "Machinist, N. Y."
Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Coal Age
Engineering and Mining Journal-Press
Ingenieria Internacional
Bus Transportation
Electric Railway Journal
Electrical World
Electrical Merchandising
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
Electrical Retailing
(Published in Chicago)
American Machinist—European Edition
(Published in London)

A Silent Consultant

A RAILROAD man recently wrote in requesting us to advise him as to "what trolley companies are using the \$1 weekly pass," the population of the cities served by these companies, and any data we had as to the results obtained.

On looking up in the JOURNAL indexes included in the last issues of June and December of 1923, we found that in this year alone we had published thirty-two different articles on the weekly pass, giving a most comprehensive idea of its uses, results obtained, and its defects.

In about this same measure, the files of the JOURNAL form a silent consultant on almost any subject in connection with electric railway operation. It is the first place to which most railway men turn for information. For while it may not give in full some documents of considerable length, it will give the main points of those documents and thus form a key to further research if more detail is required. Practically nothing of moment in electric railway work escapes notice in the JOURNAL columns.

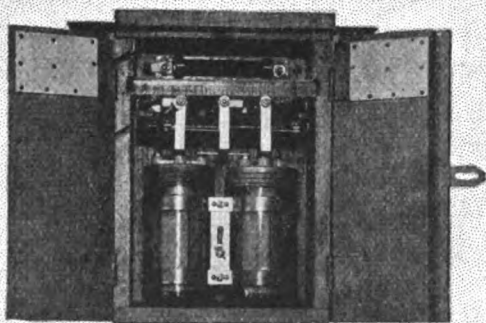
This inquiry on the pass is an example of why most railway offices keep a file of back numbers. But the surest way to preserve the file, and the handiest way, is to have each volume bound, with the index for each six months in front. This makes references easy.

Westinghouse Railway Lightning Arresters

Meet every requirement for the Car, the Line and the Station



MP Arrester, 100-750 Volts



Type AR Electrolytic Arrester
For Voltages up to 3800



Type A Electrolytic Arrester
For Voltages up to 2500



The MP Arrester is still the standard after 20 years of meritorious service. The 1924 model has an improved housing suitable for either indoor or outdoor mounting on the car, on the pole or in the station. A single design meets all applications.

Type AR Electrolytic Arrester is a direct-current arrester for car or station use. The arrester should be used for each 500 kilowatts of feeder bus, converter or motor-generator capacity.

The arresters are mounted, and securely held in asbestos lined cypress boxes. For mounting beneath the car the boxes have a flat top. For mounting in the station, or on the car roof, or for outdoors, the boxes have a slanting roof.

Type A Electrolytic Arrester has a greater discharge capacity than the AR arrester and is used most extensively in substations. The area of aluminum tray wetted by electrolyte is several times that of any other aluminum-cell arrester. It has the greatest discharge capacity of any direct-current arrester, and is not limited to any particular kilowatt capacity of circuit.

Descriptive Leaflet 20021 and 20022 gives full particulars.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa,

*Sales Offices in All Principal Cities of the
United States and Foreign Countries*



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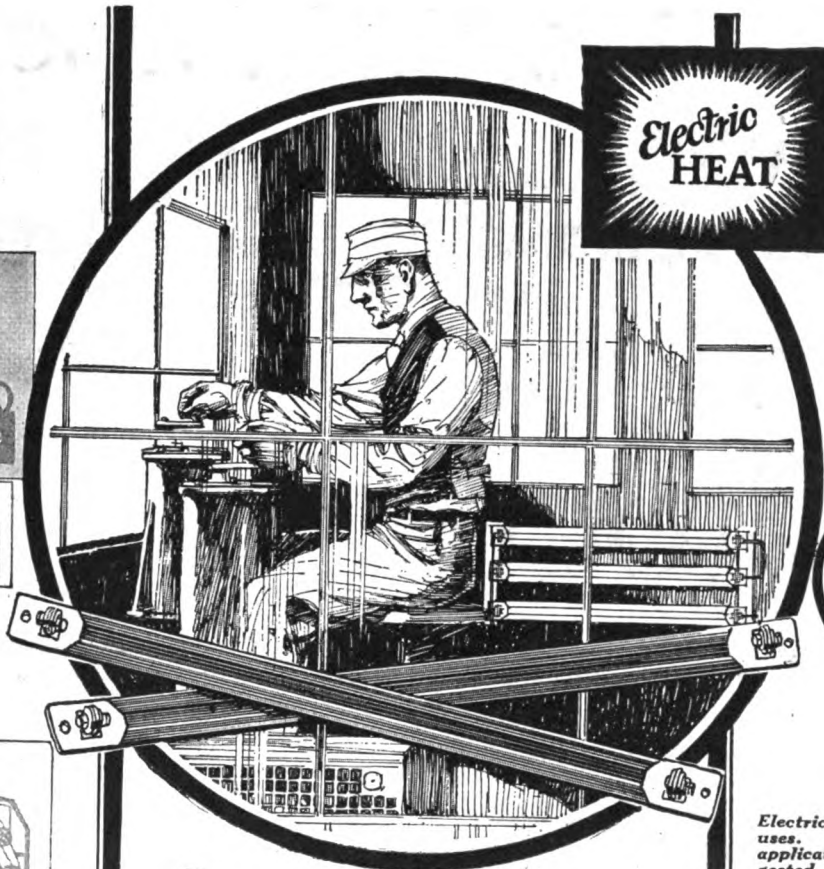


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HEAT**



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Right now is the time to install them; when Jack Frost is beginning to reach out with his cold fingers to nip some of those exposed pipes—when the watchman begins to visit the boiler room frequently, because his shanty is so cold—when you begin to realize it is almost cruelty to ask a man to work all day in a cold crane cab.

Westinghouse electric space heaters save all this inconvenience. They are inexpensive, easy to install, and do not cost much to operate. Let your electrician wire up a couple of space heaters in some of those hard-to-heat places, and see how nicely they take the chill off on a cold morning. No fumes, no dirt, no flames to start a fire. Just turn on the heat when you need it, and turn it off when you are through.

A postal to the nearest Westinghouse office will bring sizes and prices.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania

Sale. Offices in All Principal Cities of the
United States and Foreign Countries

See Your Telephone Directory

Electric heat has many uses. A few of these applications are suggested by the small sketches. Electric heat can be used in your business.



Westinghouse

Easy for the Crocus

HERE in Philadelphia it's warm and balmy while we pen this message. Looks as though the crocus could push its head out without encountering a blanket of snow. All of which suggests preparation for spring maintenance work — for example, ordering those additional track grinders, stocking up on grinding wheels and bricks, ordering some more Ajax arc welders.

Maybe it will be snowing by the time these words appear, but the crocus — spring — maintenance work — track restoration—will soon be with you. Ready?

*Ready now—
complete descriptive bulletins.*

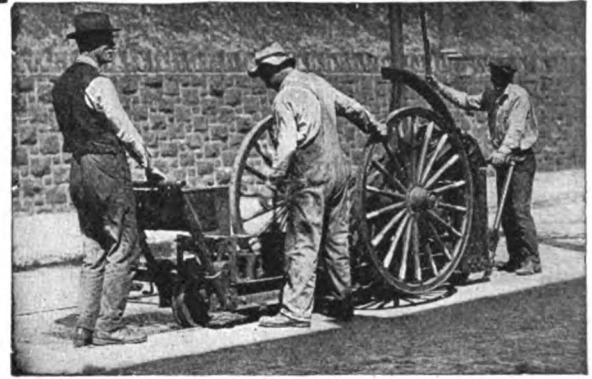
Have you the set?

Railway Trackwork Co.

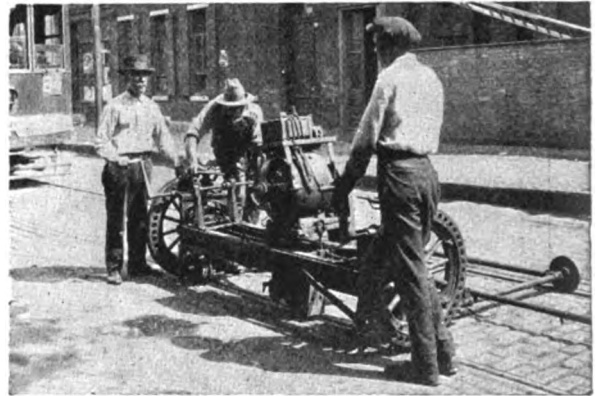
3132-48 East Thompson Street, Philadelphia

AGENTS

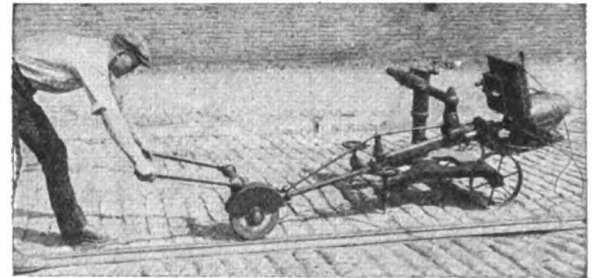
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CHAS. N. WOOD CO., BOSTON
ELECTRICAL ENGINEERING & MFG. CO., PITTSBURGH
ATLAS RAILWAY SUPPLY CO., CHICAGO
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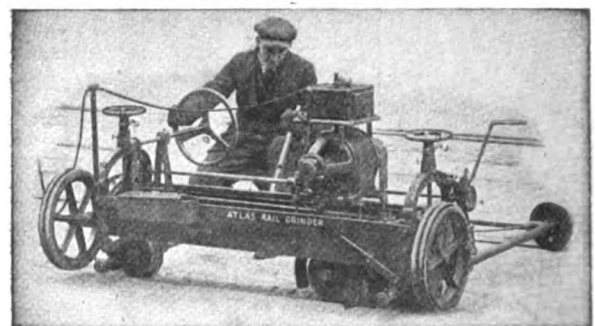
"Reciprocating" Track Grinder



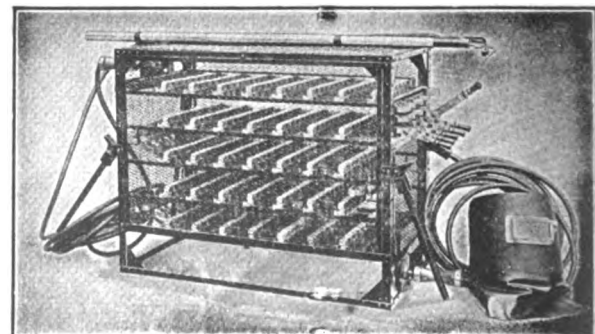
"Universal" Rotary Track Grinder



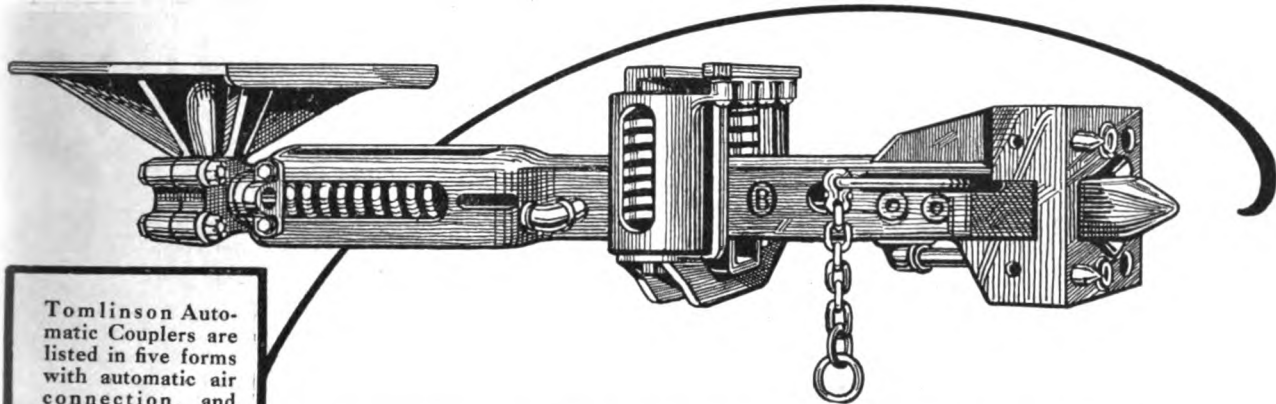
"Hercules" Rail Grinder



"Atlas" Rail Grinder



"Ajax" Electric Arc Welder

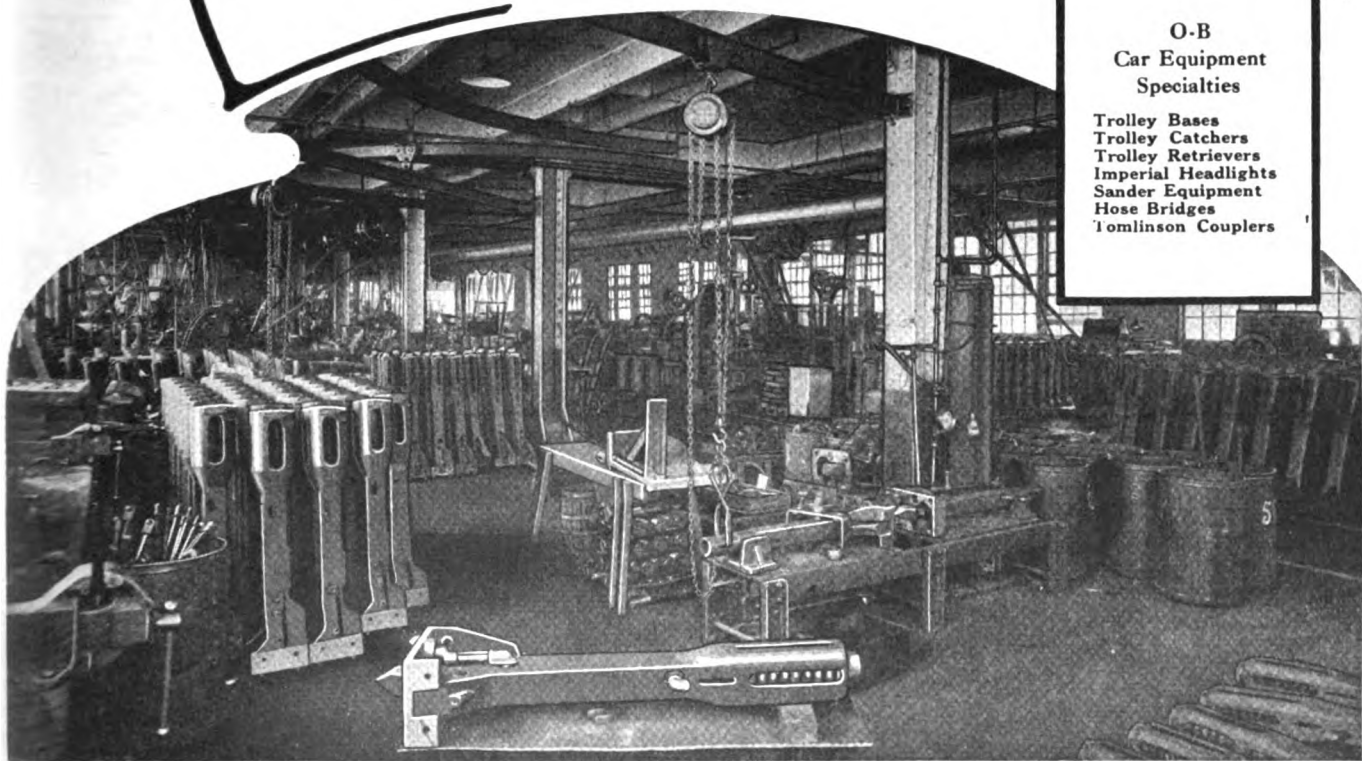


Tomlinson Automatic Couplers are listed in five forms with automatic air connection, and one MCB type. O-B Automatic Electric Connections are readily adapted to four of the air connecting types.

THE TOMLINSON COUPLER *And where it is assembled*

This is a corner of the O-B plant where the finishing touches are put on the assembly of Tomlinson Automatic Couplers. Here also, each coupler is given a thorough coupling test, including air tests on the air couplers. The test bench is shown just below the chain block.

O-B Service to electric railways, of which the manufacture and application of Tomlinson Couplers forms a prominent part, is based on a policy of applying products from a modern plant through an organization of conscientious people with an honest desire to serve.



O-B Car Equipment Specialties

Trolley Bases
Trolley Catchers
Trolley Retrievers
Imperial Headlights
Sander Equipment
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Tomlinson Couplers

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Mansfield, Ohio, U.S.A.

TROLLEY MATERIAL—ELECTRIC RAILWAY CAR EQUIPMENT—RAIL BONDS—HIGH TENSION PORCELAIN INSULATORS—THIRD RAIL INSULATORS

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Another Need for Power Brakes is Filled

THE introduction of trackless trolley transportation has been accompanied by a new need for power brakes.

With customary foresight, we have developed a special type of Air Brake equipment to meet this need and its adaptation will be found to add greatly to the safety and all-around practicability of trackless trolley service.

The equipment is light and simple in design, but rugged, and provides all the essential features of the standard Westinghouse Traction Brake.

Its advantages will be readily appreciated by trackless trolley operators, who sense the need for unlimited, flexible braking force which can be applied instantly and smoothly, without exertion.

Westinghouse Traction Brake Co.
General Office and Works: Wilmerding, Pa.



WESTINGHOUSE TRACTION BRAKES

Steel Twin Tie Track

***2,391,534 feet of
Permanent Base
at \$4.00 per foot***

THESE figures represent the total approximate value of Steel Twin Tie Track Foundation now in service on 147 Properties in the United States and Canada when, after a long and economical life, it will be necessary to renew worn rail and paving.

Now, nearly two years after the first test renewal installation was made, it can be positively stated that Twin Tie Track is renewable, as is also I-Beam Tie Construction laid on a concrete base.

This startling development alone

in Steel Tie Construction warrants the investigation and consideration of this design for all your 1924 Paved Work.

But the other reasons for using this economical permanent, adaptable and easy riding track have lost none of their force.

All details, including an estimate on the detailed cost installed on your property, are included in our folder on Steel Tie Track Construction.

Before closing your plans for 1924 Paved Work please ask for it.

THE INTERNATIONAL STEEL TIE COMPANY
CLEVELAND, OHIO

A Question—

to the man who pays for platform time

ARE your car doors still opened and closed by clumsy slow-moving hand-operated devices which tire the trainmen, and reduce the schedule speed?

to the man who pays for accident claims

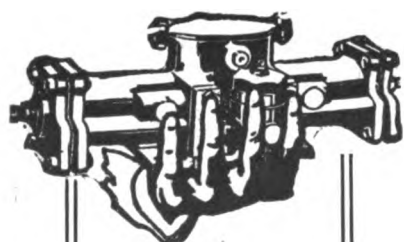
DO YOU still have expensive accidents because your cars lack proper equipment for protecting passengers from boarding or alighting while the car is in motion?

Why? Why tolerate these conditions?

Things like these are hold-overs from the Dark Ages of street car operations. They're out of date today. It's not a question of cost because modern pneumatic door operating equipment pays for itself by the savings it makes.

NATIONAL PNEUMATIC EQUIPMENT

**will speed up schedules
and reduce these accidents**



Door Engines
Door and Step
Control
Operating
Mechanisms
Motorman's
Signal Lights

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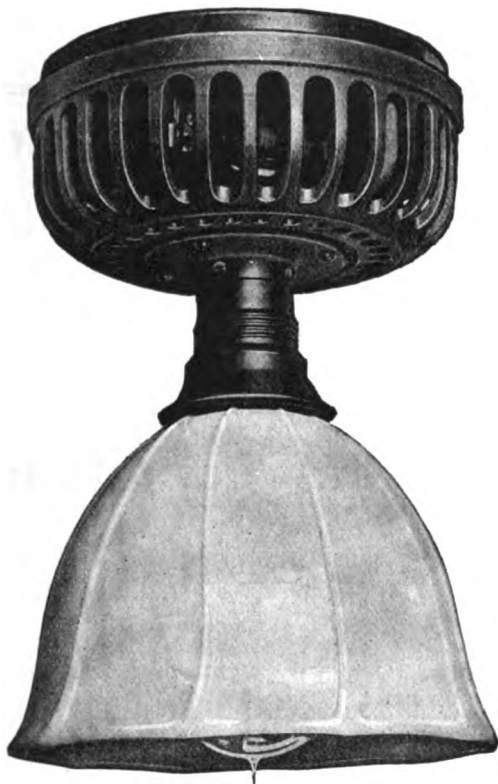
Principal Office: 50 Church Street, New York

Philadelphia—Colonial Trust Building Chicago—McCormick Building
Works—Rahway, New Jersey

Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.

KEYSTONE

Compensating Fixtures



Keystone Compensating Fixtures are but one of hundreds of car equipment specialties bearing the Keystone trade-mark. Like all other specialties these fixtures have been thoroughly tried out in service before being introduced by the E.S.S.Co. organization.



The burning-out of any lamp in a series car lighting system will not affect the burning of the remaining lamps when Keystone Compensating Fixtures are used.

The advantages of one or two circuits using these fixtures as compared with several circuits of small lamps, are as follows:—

- Greatly reduced cost of lamp renewals.
- Greatly lessened loss of lamps from theft.
- Immediate evidence of burned-out lamp.
- Vastly improved appearance and lessened glare.
- Greatly simplified car wiring.
- Better illumination for a given total wattage consumption.

This fixture consists of an ornamental fire-proof canopy in which is contained the necessary number of enameled resistance units to represent the equivalent capacity and resistance of one incandescent lamp. The resistance is normally out of the circuit, but the removal, breaking, or burning-out of a lamp automatically connects the resistance in series and thus the continuity and normal resistance of the circuit is maintained.

The growing tendency toward the operation of high candle power incandescent headlights in series with one or more circuits of car lamps and also the increasing use of larger units in car lighting has made a device of this character practically a necessity.

Write us about your particular problems

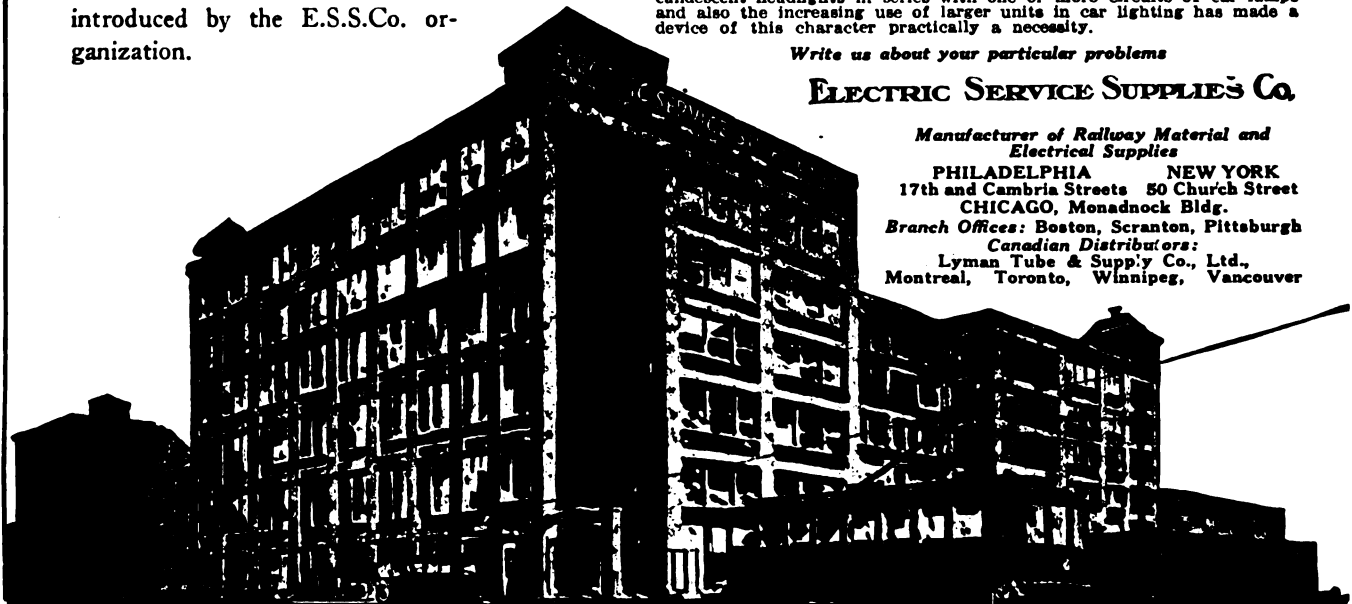
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A B P Standard No. 10

"To determine what is the highest and largest function of the field he serves and then strive in every legitimate way to promote that function."

THIS is the tenth and last of our Standards—the capstone of our ethical structure. It has been subscribed to by the publisher of this paper, and by every other member of The A B P, Inc.

Back in 1921, when the outlook was rather discouraging, our publishers held a meeting in Chicago, the theme of which was "HOW to SPEED the REVIVAL of BUSINESS." A great publisher, an ex-President of the association, expressed the duty of business papers in these words:

"But if the task be hard, if it require editors and publishers with big brains and great vision, the prospective reward is correspondingly great. Never has there been such an opportunity. Never were our industries more in need of help. Never would they be more grateful for full and true pictures of conditions, for wise counsel, and courageous leadership, as a result of unselfish devotion.

"This is a time when we should think how much we can give, rather than how

much we can get. We should give all that we can first, hoping that there may be a margin of profit.

"This is a time for more patriotism, for greater leadership and less selfishness. The Business Papers must make the first investment living up to this thought. With the opportunities that are ours today, the watchword must be: Dividends small, Service large. We must be bulls on American business and not fear to make an investment in the affections and confidence of American business men."

We could ask for no finer commentary on the ideals back of Standard No. 10. For nearly an hour, this broad-visioned publisher elaborated upon the need for unselfish service, and he and the others went back home to do their mightiest to lift business up.

We have given you these intimate talks on our Standards because we believe you are entitled to know the moving forces which are back of the great organs of business which justly enjoy your confidence and support.

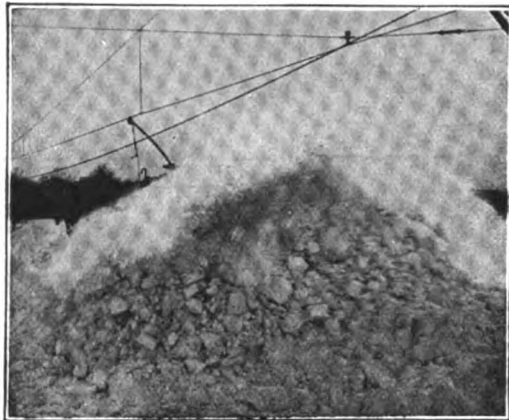
THE ASSOCIATED BUSINESS PAPERS, INC.

HEADQUARTERS: JESSE H. NEAL, *Executive Secretary*
220 WEST 42nd STREET

NEW YORK CITY

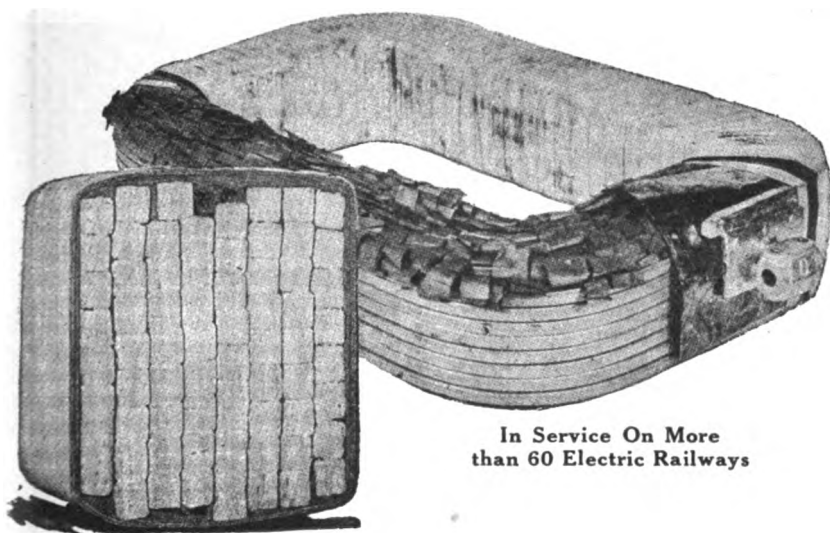
“Lost eighteen copper coils on snow-fighting equipment in last week’s blizzard. Your aluminum coils stood the same service O. K. Rush twelve more. Duplicates our last order”

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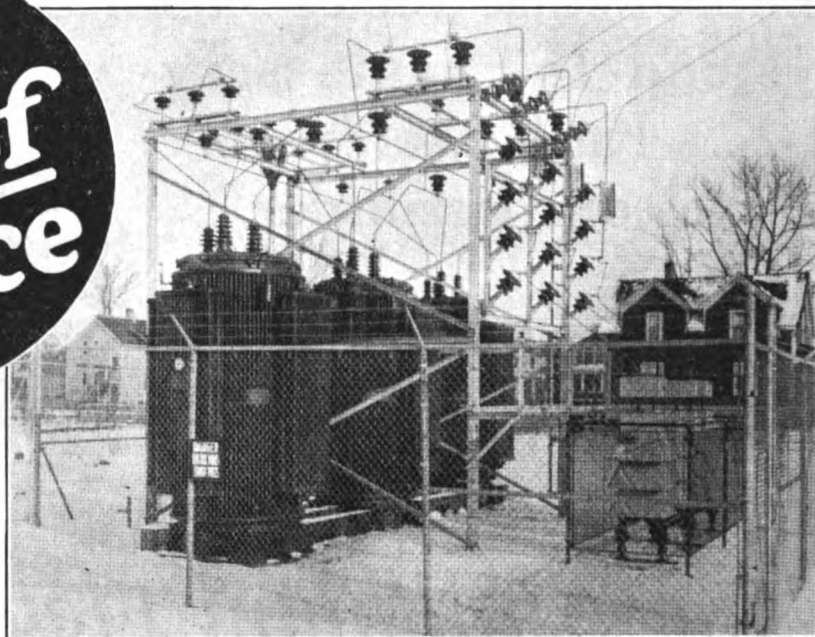
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Galena Service Engineers are not theorists. Their efforts are not expended in experimental trials of this or that method in the hope of finding the right one. Trained specialists in lubrication, familiar with every type of equipment, their active co-operation becomes an asset of positive value in enabling your organization to maintain a high standard of service and effect a material reduction in maintenance costs.

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Galena-Signal Oil Company

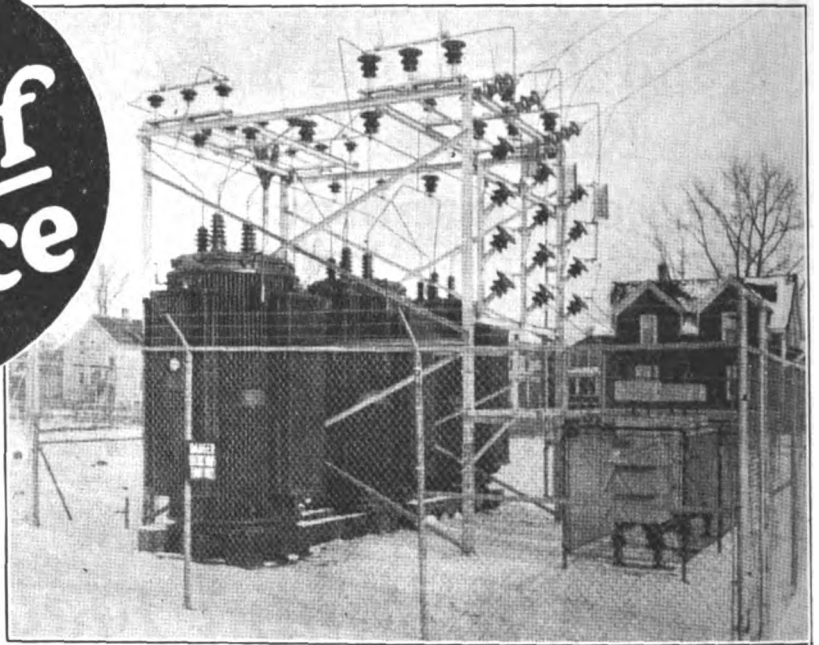
New York

Franklin, Pa.

Chicago

and offices in principal cities





The transformer station enclosure without annual maintenance cost—

Transfer station enclosures that will last for years without annual painting or other upkeep cost—

That is the big contribution to better fencing of the Cyclone Fence Company in its latest achievement—"Galv-After" Chain Link Fence-Fabric Heavily Hot-Dipped, Zinc-Coated (or Hot Galvanized) AFTER Weaving.

This new and exclusive Cyclone process establishes new standards of fence durability. The ordinary fence fabric made of wire "galvanized" *before* weaving cannot begin to compete in years of service. And with the ordinary fence there is the upkeep—annual painting and other expenses.

Cyclone "Galv-After" Fence for transformer stations is standardized; built with removable panels. Facilitates repairing, changing equipment, etc. A real safety measure for those who must be in proximity of station. Prevents accidents to persons as well as damage to equipment. Thus the economy of Cyclone Transformer station enclosures soon repays cost. Let us send you complete information about Cyclone "Galv-After" Fence for central and transformer stations, right of way and park fence. Write nearest offices, Dept. 38.

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GALENA SERVICE provides the surest and most logical means of securing efficiency and economy in lubrication. It works with and for your road for the purpose of securing the greatest possible return for every dollar expended for this item of maintenance. It has proven a most welcome auxiliary to Electric railways everywhere.



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New York

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and offices in principal cities



The quality once sought is worth maintaining



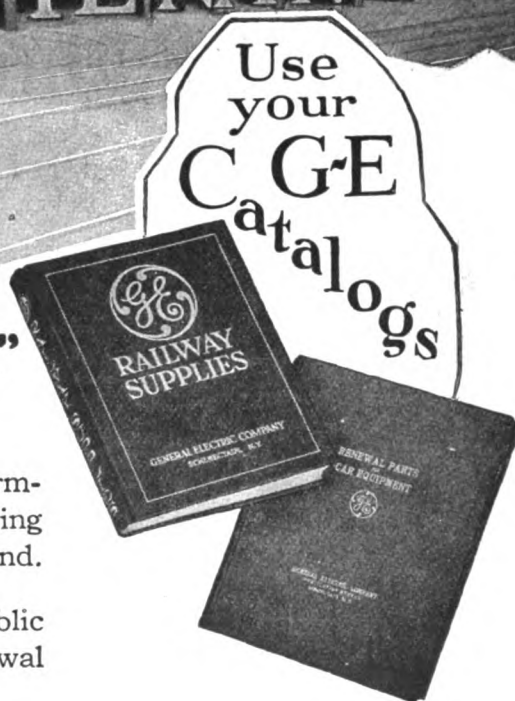
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A Good Motto and why:**

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—You cannot be assured the good will of a public served with equipment made unreliable by renewal parts purchased at random.

—G-E Renewal Parts Catalogs, specially compiled to cover *your equipment*, facilitate prompt shipments and cut down losses in revenue from "shopped" cars.

—Only the maker of your G-E equipment can make parts which exactly duplicate the originals. Could any other parts give better service?



**General Electric Company
Schenectady, N. Y.**



GENERAL ELECTRIC

New York, February 9, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 63
Number 6

Modernizing Plea Is Taking Hold

IT WAS good to note at the recent meeting of the Central Electric Railway Association that the agitation which has been made by the leaders of the industry for displacing obsolete with modern equipment and otherwise modernizing railway service is really beginning to take serious hold. Even some of the "old timers," whom one would expect to be among the last to see the need for a change, were very plain spoken about the kind of transportation that is being dispensed by many companies. This is indeed encouraging and it presages even more activity of a modernizing character this year than during 1923, good as that was. For the money can be had if the management has the will to progress, unless the railway is one of those that should never have been built.

A Treacherous Way to Make a Market for Buses

FEELING exists here and there that attempts are being made to coerce electric railway companies into buying out existing bus lines, or to force them to buy new buses to anticipate a rival installation. Some may think that to get a certificate or franchise and start a bus line, whether there is any prospect of its paying or not, with the idea of selling out to the railway company which will want to buy to avoid competition, offers good opportunity to make some easy money. It may work in a few instances, but it is certainly a treacherous practice that must soon come to grief.

In our present state of regulation and organization in the electric railway field, and with the opportunity which the bus affords to fight fire with fire, it seems almost incredible that much headway could be made in such a nefarious way of going into the bus business, or indirectly, of selling buses. Yet some railway men have had cause to give serious thought to this matter, and attention is directed to the matter for what it is worth. It comes to the attention of this paper again this week in a letter from a railway executive, from which we quote:

I am very much concerned with some evidences I have recently seen of blackmailing attempts on the part of certain bus manufacturers, or by those who are undoubtedly in their employ. I think the bus people should be given clearly to understand that while future sales opportunity is with present street railway companies, this field must develop naturally as the legitimate demand for buses arises, and not through some forcing processes along blackmailing lines.

I can well remember fifteen years ago in certain states where utilities were not commission controlled that it was one of the favorite outdoor sports of some fly-by-night promoters to apply for a franchise for a light and power service under some pretext, which, if secured, could be peddled at a good profit to the company already in the field. I know that there are certain interests now exploiting and getting ready to exploit the street railway field.

Such a course would reflect a most shortsighted policy on which to build business, and it would hardly be undertaken by any responsible bus manufacturer who expected to remain in business.

Akron Company Had No Other Course but to Cease Operation

AKRON, rubber city of 200,000 population, has been without trolley service since Feb. 1. Having completely discharged its contract obligations, the Northern Ohio Traction & Light Company ceased operation with the expiration of its franchise at the close of Jan. 31. Throughout all the war period and the five years of high operating costs since, the company has continued to provide service at the pre-war 5-cent rate with universal free transfer.

It has done even more. In spite of continuing losses, it has shown its good faith by purchasing many fine new cars and by augmenting the railway lines with bus routes, in order to provide Akron with good, up-to-date transportation. It has not deferred these improvements, nor maintenance, as many companies have done, until the city was signed up to a satisfactory adjustment of the fare. It has gone ahead, confident in the fairness of the public when it came to understand the conditions.

Meantime it has done a splendid piece of public relations work and has succeeded in winning a generous measure of support from most of the civic and business and social organizations and from the thinking public in general. It has told its story in a constructive, friendly way, and has seemingly convinced every one of the justice and necessity of its requirements except the public authorities and the large foreign labor element.

Repeatedly, a settlement of the fare question had all but been made, and then in the final vote or veto, politics has prevailed over the best interests of the public and a square deal for the railway. Having been put off and betrayed in these negotiations during the past several years, the company could have no assurance that any other treatment would ensue, were it to comply with the Mayor's recent requirement that service be continued for three months longer at a 5-cent fare while the matter was debated.

The company had no other course but to shut down. There was no reason for it to continue longer to operate its cars at a loss. It had no recourse to the courts. The state commission has no jurisdiction over the utilities of any Ohio city. It has not even been able to afford the company any relief from the jitney competition which the city has permitted in spite of the monopoly-implied franchise to which it has held the railway. Furthermore, the Mayor was elected on a 5-cent platform. So there was nothing to do but shut down.

Jitneys did not provide a satisfactory substitute

service in New Jersey, Des Moines, Saginaw or Toledo. There is no better prospect that they can do so in Akron. In fact, operating conditions are much more severe in Akron on account of the heavy grades. While the unorganized, haphazard operation of heterogeneous buses will not be a true test of the bus, nevertheless, any real bus company would be even more foolhardy than the railway to take a franchise at a universal 5-cent fare with free transfer. This is entirely aside from the very serious question to Akron of whether buses could possibly handle the service in a city of this size.

Hence, the question is: How long will it take for public sentiment to assert itself and force the Mayor and city council to come to their senses and do what is truly for the best interests of the city. Perhaps the nickel could be retained as the basic fare, if transfers were abolished and the fare made to apply for the ride from any point to or from the center of the city. By this is meant that the conductor would collect a nickel as the passenger enters the car while inbound to the downtown section. Outbound he would collect a nickel as the passenger leaves the car. The few passengers who ride through the downtown section from one side of the city to the other would pay two fares for the ride. This is the simplest application of the zone fare principle.

It is believed such a fare plan would provide the company with sufficient revenue and let the Mayor out on his 5-cent fare pledge.

Business and Sentiment— There Must Be Progress

AN "OLD TIME" railway operator—one who has grown up from the ranks—was asked whether he ever thought it advisable to shake up his supervisory force. "It probably would be advisable," said he, "but I haven't the heart to do it. These men have grown up with me. They are faithful pluggers and even if they are not abreast of the modern idea of railroading they will be safe in their jobs as long as I am here. Some day, no doubt, a new man will take my place, one without any sentimental connections with the past. He will weed out the 'dead ones' in the organization and the good results will be very evident."

There is much truth in this philosophizing of an "old timer." We have seen it worked out on more than one property. Our sympathy, like that of the operator quoted above, is with the men who have given their best years to any job. They, perhaps, were promoted on their merits in the past. Time came when they fell behind in the modern pace. It would seem heartless to dismiss them so as to make way for men more efficient. If pensioning arrangements had been made this would not be necessary. However, in many cases positions might be found for them elsewhere on the system where they would not stand in the way of property development.

It is a subject worth thinking over because many a manager is up against the competition of motor bus companies and other organizations which are starting fresh with a very aggressive personnel. If a study of supervisory forces reveals stagnant situations, the sooner they are cleaned out the better. A railway executive owes a duty to his employers which is just as important as the sympathy he may feel for old timers down the line.

One Stock Dividend that Does Not Indicate Swollen Profits

STOCK dividends by public utilities, and particularly by electric railways, are so rare that particular interest attaches to the plan approved on Feb. 6 by the stockholders of Brooklyn City Railroad to pay a stock dividend of 33½ per cent. Offhand, the public thinks of swollen profits, concealed assets, and all the other things that often are played up when distributions of this sort are made.

To get a true picture of the situation it is necessary to get the perspective furnished by the history of this road. It always has been a profitable enterprise, being favorably located. The long-haul business in Brooklyn naturally goes to the rapid transit lines, so that the average ride per passenger is not as great as on other surface properties in large cities. Also, the management is notably enterprising and efficient and the Borough of Brooklyn is developing rapidly in prosperity and population.

Incorporated in 1853, it never has had financial difficulties of its own. In 1893 it was leased for 999 years to the Brooklyn Heights Railroad, which later became part of the Brooklyn Rapid Transit System. The value of the property is indicated by the terms of the lease, the lessee assuming operation and agreeing to pay all taxes, organization expenses and fixed charges, and also a guaranteed rental of 10 per cent on the capital stock amounting to \$12,000,000. This, of course, was passed on to the stockholders in 10 per cent dividends. This rental was paid, except for an adjustment for a claim against the company, continuously until the receivership of the B.R.T. in July, 1919. The owners of the Brooklyn City Railroad sued for possession of their property, and it was returned to them on Oct. 19, 1919.

Following the resumption of independent operation, the management found it essential to spend a large amount of money for improvements and additions. There was a good deal of deferred maintenance and a shortage of rolling stock when the property was turned back. On account of the financial situation, particularly since the company had been associated with the other Brooklyn roads, it was decided to plow back the earnings into the property. Accordingly no dividends were paid after that of July, 1919, until December, 1922, when payments at a rate of 8 per cent were resumed. Three dividends were paid at this rate, and Sept. 1, 1923, the 10 per cent dividends were again paid.

In this period of suspended dividends more than \$4,000,000 was spent for rolling stock and \$600,000 for track reconstruction and roadway improvements, chargeable to capital account. This amounts to 38 per cent on the \$12,000,000 of stock. Had dividends been paid at the 10 per cent rate continuously, the amount received by the stockholders in cash would have been 34 per cent. Instead they are to receive additional stock amounting to only 33½ per cent. As it works out the market price of the stock on Feb. 6 was 13¼ (par 10), so that the cash value of the stock dividend was slightly below 33½ cents on the dollar. The stockholder, however, has been forced to wait for this distribution, and has had no return on his investment for over three years. The market price of the stock naturally fell considerably below par. Furthermore, the guarantee of payment has been abolished, so that instead of being a gilt-edged investment the stock must now take its place with others whose dividends fluctuate with their earnings.

Plotting City Schedules

A New Method Is Suggested by Which the Schedules of an Entire System May Be Seen at One Time—By the Use of Colored Threads and Beads the Effect of Various Changes Can Easily Be Visualized

By Charles Rufus Harte

Construction Engineer the Connecticut Company

SO LONG as the electric railway furnished the only practicable means of general mass transportation, the public was perfectly satisfied with a schedule of operation which showed a reasonable regard for local requirements; if the service met the opening and closing hours of the chief industries and connected with the important trains, the rest of the car movements could be arranged to suit working conditions of the railway employees rather than anything else. With the advent of the automobile, however, the situation was materially changed. The owner of a car could step into it at almost any moment, ride downtown much faster than on the trolley, and be landed at the door of his office or place of business. That the cost of such movement was greatly in excess of the cost of the trolley ride; that the time absorbed in parking the car, and the time lost due to the fact that the map could read on the trolley ride down, but could not do so when driving his own car, generally ate up the apparent saving, was not usually appreciated, and if appreciated was almost never appraised at full value.

So long as the number of automobiles was comparatively small this trend received little notice, but the quantity production of a number of low-priced cars and their employment in competition with the trolley suddenly called attention to what promised to become a most serious condition. The public apparently not only found little use for the trolley as a means of transportation but was quite unconcerned as to how unfair might be the competition with it.

The growing appreciation of the short-sightedness, not to say the economic crime, of thus virtually wrecking what every real test has shown to be a most essential utility is steadily eliminating the irresponsible "jitney" and is equalizing the conditions of competition by the more legitimate bus lines. But there are in the latter service elements of convenience and speed which are rightfully characteristic of such service which the trolley must meet, not by attempting restrictive legislation but by producing at least as attractive transportation. Today quite a little work is being done along these lines.

One trouble in connection with the problem is the difficulty of getting a—so to speak—moving picture of the car relations of the entire system, if the latter is anything more than a single line. The zigzag diagram, made up on a chart with time measured horizontally and distances vertically, or vice versa, is admirable for the single route. It is not well adapted, however, to the combination of two or more routes, nor, when the writer some time ago was called upon to make a study of certain operating conditions, could he find any information regarding such a scheme.

As one result of that study there was developed, very largely by Harold Bates, principal assistant to the writer, the diagram here described, which it is believed does give just such a picture.

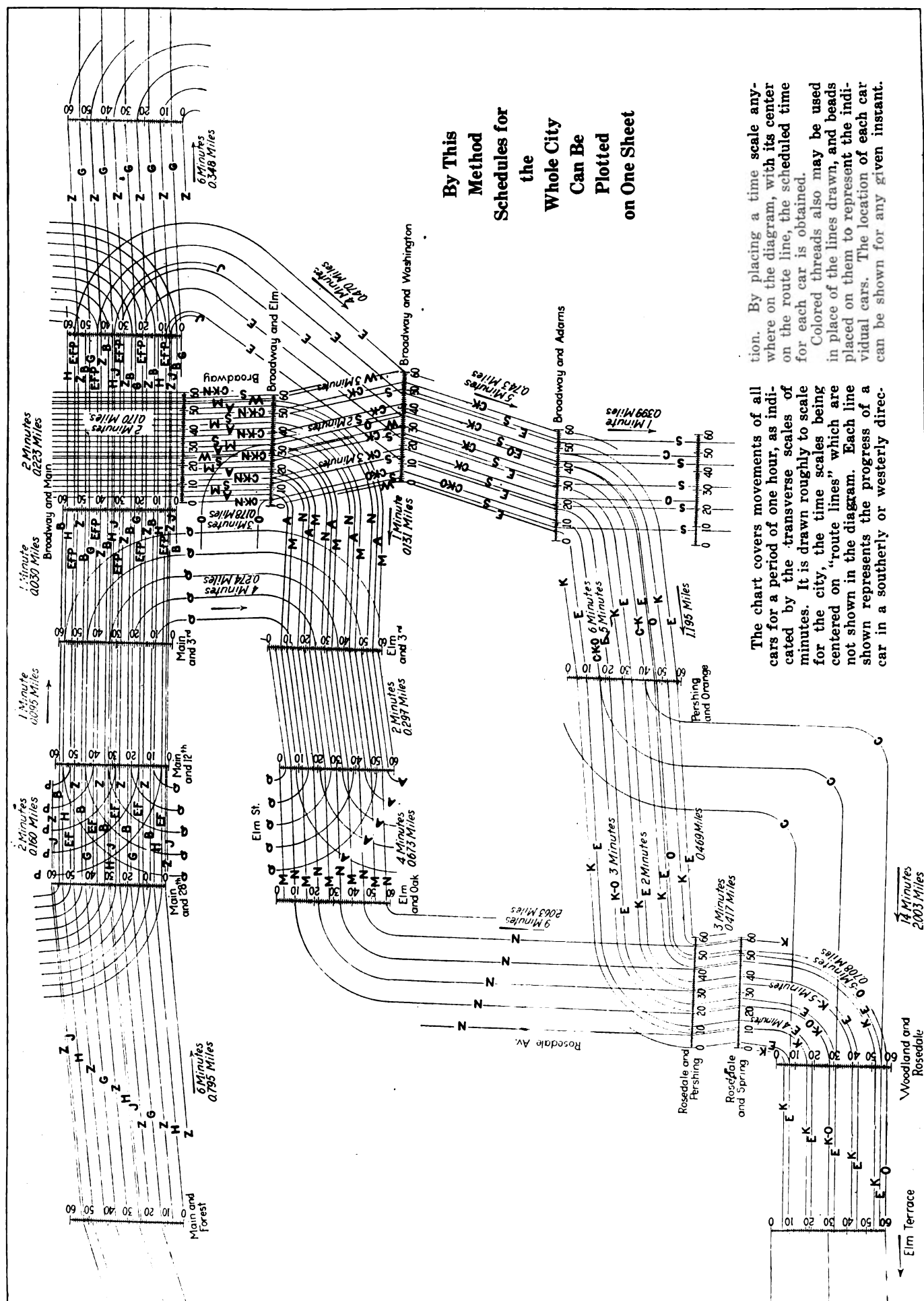
Briefly, the diagram consists primarily of a single broken line plan of the territory under consideration, preferably to scale, although this is not essential. Indeed, in most cities, the trackage in the center must be on so large a scale that it would be impossible also to have the outlying trackage on a sheet of reasonable size unless it is shown diagrammatically and greatly shortened. These broken lines are referred to as the route lines. At each junction point, and at other important points there are drawn "clocks," or lines of equal length, divided into sixty equal parts. Each clock is placed with its center point on its route line and perpendicular to the latter. Operations in both directions can be shown on one diagram, but if there are many movements it will usually be found more convenient to plot, say, all north and west movements on one sheet, and all south and east movements on a separate one.

To plot the operation it is necessary to know the time at which any car of a route leaves the starting point, the headway and the running time between some of the more important points. If the operating speed varies materially in different parts of the territory, it is essential to know when cars are due at the beginning and at the end of each of these parts. As it will shortly appear, with this information at hand determination of the corresponding facts for any point between is easily made.

To set up the facts, a start is made at one end of a route, and there is marked on the clock at that point the time at which one of the cars leaves, one end of the clock being taken as the even hour, and the route line being at the half hour. The times at which the same car passes each of the successive clocks to and including the one at the other end of the line are then marked in their proper places, and a line, the car line, is drawn connecting them. The plotting of the movement of that group of cars is then completed by drawing parallel lines separated by the headway, as measured by the clocks. If, now, at any point between clocks a similar movable scale is placed at right angles to the route line with its center upon it, the times at which the cars are due at that point are shown by the intersection of the "car lines" with that scale. Moreover, if a line is drawn through the same point of each clock, its intersections with the several car lines indicate the points where the cars represented by those lines should be at that time, and if map pins are set at these points, a "still" picture is given of the route as it should be at that particular moment.

EFFECT OF SCHEDULE CHANGE EASILY FOUND

Another use of the chart is possible, if it is mounted on a board and colored threads are employed to represent the time lines and car lines, and colored beads sliding on the car-line threads are used to represent the cars. Then if these beads are slid along the



car-line threads to the intersections of these threads with the time-line threads or clocks, the effect of any change in speed, headway, or starting time can be readily studied, or shown to those citizens who are always sure they can materially better schedules but do not always realize that a change of time at one point on a route may result in serious bunching elsewhere. Again, if these beads are slid along to points at which it is desired to have them at the times represented by the time lines through them, and then car lines are drawn through the beads, there will be indicated the schedule between those points necessary to obtain the desired result.

Perhaps the best way to show the plan is to take a specific case. The diagram shown represents south and west movements at the date the diagram was being developed. It does not show the route lines, which were in pencil on the tracing, but were erased after the clocks had been located, because it was thought with so many car lines they were apt to cause confusion. Later it was found that by the use of a broken line, this difficulty could be obviated. It was also found desirable to line up the clocks on the route lines, and at turns to put clocks at both ends of the curves, and to take the distances between clocks, disregarding the lengths of the curves.

AN APPLICATION DESCRIBED

Starting at the Broadway loop going south it will be seen that the suburban O line cars, operating on thirty-minute headway, pass Broadway and Elm at three minutes and thirty-three minutes past the hour, the first one being on the same time as the first C and K cars after the hour. The C and K cars, however, are on twelve-minute headway, so that the second O car, going south at thirty-three minutes past the hour at Broadway and Elm, is midway between two Cs and two Ks. At Pershing and Orange, where the C line branches off, the O cars pass at seventeen and forty-seven minutes past; at Pershing and Rosedale the times are twenty and fifty, and at Woodland and Rosedale, when the C cars return to the main line, the O cars are at twenty-eight and fifty-eight, the C which was on the same time as an O at the start now being, because of the longer run, at thirty-one.

It will be seen that between Broadway and Adams, and Pershing and Orange, the cars are evenly spaced, except for the O suburban line on thirty-minute headway, while at Woodland and Rosedale they are in groups with three and nine minute intervals. This very clearly shows a local situation. The E cars do not run so directly to the shopping district as do the Ks and Os; as a result, they are not quite so popular and can make a little better time. By bunching them at the outer end of the line the drag on K and O, due to their more frequent and longer stops, effects an even spacing in the shopping district where this is particularly desirable. The gain in running time of the E cars over the other cars, during the outer part of their run, due to their higher speed, is clearly shown in the chart.

Obviously, fully to understand any situation, all the facts must be known. Every case has its real "local conditions" which, as in the instance given, may make it desirable to "bunch" at one point in order to obtain better conditions at points of greater traffic and importance, and these conditions often change quite suddenly. The schedule of today, for the lines shown, is very materially different from the diagram, which was

of the spring of 1919. The scheme, however, seems to give a very satisfactory method of studying the effect of such changes in conditions, and of changes in schedule to meet them, and as some little inquiry has on the one hand indicated quite a little interest in the diagram, and on the other has failed to show anything like it, it is here described in the hope it may prove of value to the industry.

U. S. Census Figures for 1922 Show Gains for Electric Railway Industry

THE preliminary figures of the electric railway census for 1922 as compared with 1917 show a decrease of 2 per cent in track mileage and an increase of 5.7 per cent in the number of passengers carried. Gross railway operating revenues amounted to \$925,477,485 in 1922, an increase of 42.3 per cent as compared with 1917; operating expenses increased 61.1 per cent, while net income made a gain of only 1 per cent.

The energy generated in 1922 aggregated 6,440,380,325 kilowatt-hours, and in addition 5,926,421,203 kilowatt-hours were purchased by electric railway companies. Of this energy 3,250,828,351 kilowatt-hours were sold for light and power purposes, for which revenue to the amount of \$90,046,953 was received.

The difference in the number of electric railway companies as shown by the census and the number listed

	1922	1917	Per Cent of Increase 1917-1922
Number of operating companies.....	1857	943	* 9.1
Miles of single track operated.....	143,904.80	44,808.31	* 2.0
Number of cars, all types.....	99,855	102,603	* 3.3
Number of electric locomotives.....	404	357	13.2
Number of persons employed.....	300,523	294,826	1.9
Salaries and wages.....	\$445,680,135	\$267,240,362	66.8
Primary horsepower, total.....	4,161,221	4,200,192	* 0.9
Kilowatt capacity of generators.....	2,969,104	2,924,779	1.5
Energy generated, kilowatt-hours.....	6,440,380,325	7,240,502,789	*11.1
Energy purchased, kilowatt-hours.....	5,926,421,203	4,947,348,042	19.8
Passengers carried.....	\$15,331,401,801	14,506,914,573	5.7
Revenue car mileage.....	2,124,443,362	2,139,801,530	* 0.7
Railway operations, revenues.....	\$925,477,485	\$650,149,806	42.3
Railway operations, expenses.....	\$678,563,107	\$421,250,838	61.1
Net revenues, railway operations.....	\$246,914,378	\$228,898,968	7.9
Auxiliary operations, revenues.....	\$91,241,607	\$59,675,286	52.9
Auxiliary operations, expenses.....	\$49,232,061	\$31,343,816	57.1
Net revenues, auxiliary operations.....	\$42,009,546	\$28,331,470	48.3
Net operating revenues.....	\$288,923,924	\$257,230,438	12.3
Taxes assignable to railway operations.....	\$64,788,315	\$45,756,695	41.6
Operating income.....	\$224,135,609	\$211,473,743	6.0
Non-operating income.....	\$32,329,229	\$20,282,948	59.4
Gross income.....	\$256,464,838	\$231,756,691	10.7
Interest and other deductions from gross income.....	\$199,453,934	\$175,305,761	13.8
Net income.....	\$57,010,904	\$56,450,930	1.0

* Denotes decrease.

† Reduction due to mergers and to companies which have discontinued operations.

‡ Excludes 27.06 miles of track in both years located in Canada but owned by companies operating in the United States.

§ In addition there were 16,118,165 passengers carried by 370 motor buses operated by electric railway companies.

¶ Chiefly revenues from electric light and power departments of electric railways.

in the ELECTRIC RAILWAY JOURNAL for Jan. 6, 1923, can probably be accounted for by different methods of classifying subsidiaries and controlled companies. The fact that the statistics in the JOURNAL covered the electrified mileage of steam railroads, which was not included in the census report, probably accounts for the difference in the mileage figures. The same explanation no doubt holds good concerning the number of cars. In regard to the number of electric locomotives, it appears likely that the greater total shown by the census includes also motor freight cars which are used for hauling trail cars, the difference being one of nomenclature rather than of actual numbers. The figures are given in detail in the accompanying table.

Pass Increases Earnings 6 per Cent

Santa Barbara, Tourist City of 30,000, Has Had Weekly Pass for Twelve Months and Has Had 25 per Cent Increased Riding

BY W. E. ERWIN

Superintendent Santa Barbara & Suburban Railway,
Santa Barbara, Cal.

THE weekly pass was inaugurated on the lines of the Santa Barbara & Suburban Railway, Santa Barbara, Cal., Dec. 11, 1922, after the approval of the Railroad Commission of the State of California.

The pass is sold for \$1 and permits unlimited riding between Sunday midnight and the succeeding Sunday midnight and is transferable. Passes are placed on sale Friday prior to the week for which they are valid and remain in the hands of the car operators until the following Wednesday. Pass sales at present are averaging about 635 per week, or one pass for every forty-five population.

Santa Barbara is primarily a tourist city. Its regular population of 30,000 is augmented during the summer and winter months by a great many transient visitors. It has no industrial and manufacturing plants and the street railway is not called upon to serve heavy peak loads so common to cities of such character. Distances from the business center are short, and the tendency to walk or accept the invitation of some friendly automobilist was impelling when the cost of the street car ride was 8 cents cash or 7-cent ticket fare purchased in strips of five coupons. These fares were approved by the State Railroad Commission and went into effect Nov. 1, 1920, and immediately resulted in a definite loss of patronage with but a slight increase in gross revenues.

Facing such problems as these, the management decided to install the weekly pass, which has now been in operation for twelve months. The Santa Barbara & Suburban Railway operates 100 per cent safety cars. In addition it operates three Moreland safety coaches into territory not served by the street railway lines and used to supplement and feed the lines of the railway. Passes are sold and accepted for transportation on the bus lines and transfers issued between buses and street cars. Ninety-five per cent of all passes are sold by car operators and bus drivers, who are enthusiastic as to the pass as it greatly speeds the traffic and lightens the burden of fare collection. The color of the pass card is changed weekly, and in addition to this a large numeral designates the week during which it is valid.

With the public there is no question as to its popularity. Car riding has increased 25 per cent and gross earnings 10 per cent, of which at least 6 per cent is directly attributable to the pass, without additional operating expense. In other words, the car riding index since the installation of the pass has been raised from 68.6 in 1922 to 86 in 1923.

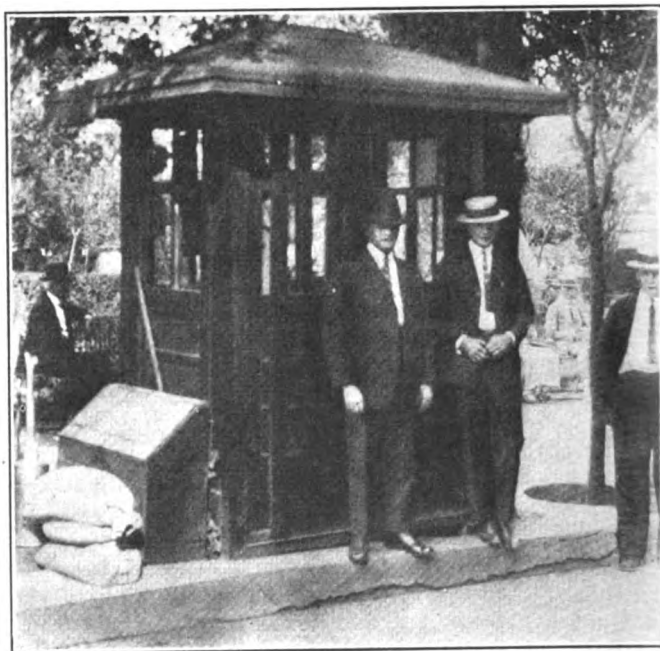
The proportionate revenues derived from the different forms of fare are: 8 cents cash, 40 per cent; 7-cent ticket, 38 per cent, and weekly pass, 21 per cent. The traffic represented by these three forms of fare is as follows: 8 cents cash, 32 per cent; 7-cent ticket, 34 per cent, and weekly pass, 33 per cent. Accurate account of pass riders is kept daily and represents 3.89 pass rides per day per pass. As the longest car ride is 3½ miles, it has been approximated that the pass rider averages less than eight blocks per ride.

The pass has naturally produced a lower revenue per revenue passenger ride since its installation, as the revenue per revenue passenger during the year prior to its installation was 7.19 cents, while at present it is 6.1 cents. Further analysis of fare earnings shows that regular patrons who formerly purchased 7-cent tickets now use the pass. This has resulted in a decrease of 27.4 per cent in this form of fare, while the 8-cent cash fare shows a gain of 10 per cent, which no doubt proves that the pass rider does not ride alone during off-peak periods.

The management is well pleased with this form of fare and believes it has increased the good will of its patrons, as the demand for lower cash fares has subsided.

Dispatcher's Booth Serves as Information Bureau*

ON THE lines of the El Paso Electric Railway an inspector is constantly on duty at the downtown plaza. His duty is not only to dispatch the car, but also to serve as an information bureau and guide to the public and tourists seeking assistance. His headquarters are in a booth, which is equipped with telephone, fire extinguisher, block and tackle for picking



The Booth Is Equipped with Telephone and Accessories for Use in Emergencies

up trolley wires, rubber gloves and, for the convenience of the public, a map of the city and a city directory. This booth is shown in the accompanying illustration. Several booths of similar type are installed at various places in the city.

The merit and bonus system of the Los Angeles Railway, whereby a Christmas bonus of \$60 a year, based on a rate of \$5 per month, is granted to trainmen who have a specified standing on the merit system, as described in past issues of this paper, has been extended by the award of additional prizes, ranging from \$10 to \$100, to top-notch trainmen in each division.

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

Combined Shop and Carhouse for Small Property

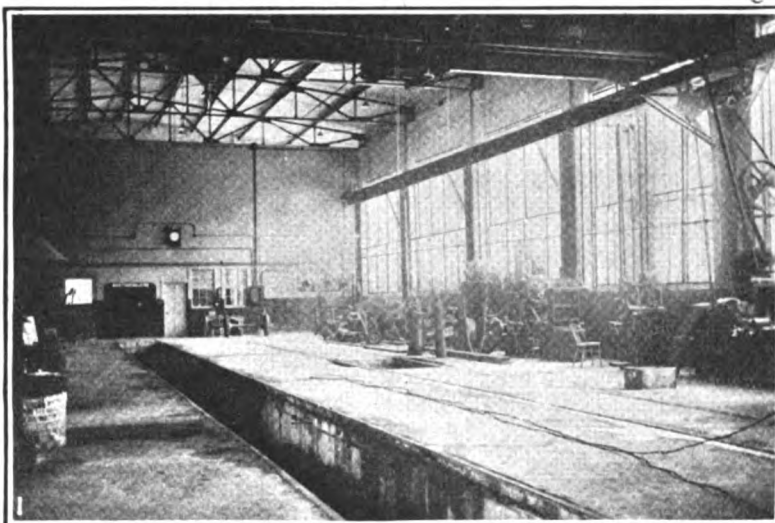
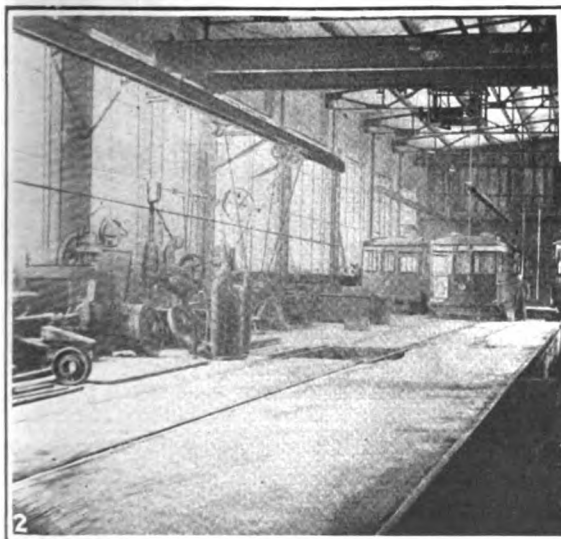
Fireproof Construction, Open Pit, Inclosed Paint Shop, Overhead Traveling Crane and Abundant Daylight Are Features of the New Oshkosh Shop—Details of Construction Are Given

TO REPLACE the old frame shop and carhouse destroyed by fire, the Eastern Wisconsin Electric Company has recently completed a building of fireproof construction upon the site of the old structure in Oshkosh, Wis. In designing this new plant considerable thought was given to the various features of overhaul and repair incident to the successful maintenance of cars in order that these duties might be performed with a minimum of labor and time. While providing adequate machinery and equipment for this work, the fact was not lost sight of that the building must also serve as a carhouse for the storage and cleaning of the cars during the night.

DETAILS OF CONSTRUCTION

The building has a concrete floor and brick rear and side walls below the windows. The roof and side walls above the windows are of hemlock planking. The floor, of reinforced-concrete construction, is broken up into several

the outside tracks, the intervening floor is carried only to within 1 ft. of the rails. This main pit, located, as it is, just inside of the entrance doors, is used for inspection and general under-rigging repairs which can be made without removing the part from the car. The elongated single track pit previously referred to is used for the general overhaul and repairs to the cars such as necessitate the use of a traveling overhead crane. Four



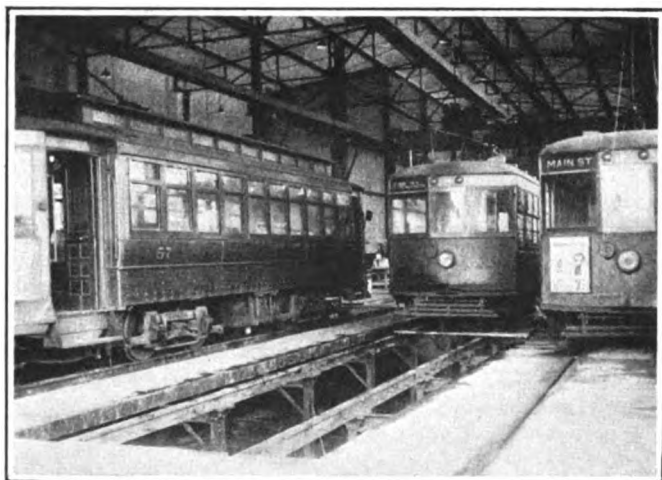
No. 1—New Oshkosh Shop Showing the Arrangement of Machinery Along the North Wall. No. 2—Cars in Position Over Inspection Pits. The Travelling Crane and Rolling Steel Doors at Front of Shop Are Seen. No. 3—Extensive Use of Windows in Side Walls and Galvanized Corrugated Iron Sheetting Above the Rolling Steel Door Openings

sections by the pits, of which there are seven, located at various points throughout the layout.

One 4-ft. pit extends the length of the building. The front 60 ft. of this pit is widened to 22 ft. and extends from 1 ft. on one side of track No. 2 to 1 ft. on the opposite side of track No. 3, as seen in the accompanying floor plan. The track, as well as the floor between these two tracks, is carried on a steel I-beam structure so designed as to leave the space between the rails of each track free from obstruction. As is the case on

other single-track pits, which vary in length from 6 ft. to 12 ft., are located at advantageous points on each of the other tracks in order that repairs or inspections may be carried on without waiting for space over the main pit.

The building itself is divided into two sections, one of which is approximately twice the size of the other, by a line of structural steel columns which serve as a support for the rail on which one end of the overhead traveling crane runs. Advantage has been taken of this



Open Pit Construction Employed in Oshkosh Shop and Carhouse

division to inclose a portion of the smaller section by means of wood framing and sash, to form a paint shop with provision for handling two cars. Double swinging doors at one end of this inclosure provide entrance from the main shop.

The roof construction is of single-span, gable-type design using angles as members of the fabricated truss, and channels with a bolted nailing strip as purlins to which the 2-in. plank roofing is secured. The trusses are spaced 19 ft. 10½ in. center to center, and are supported on brick pilasters built up from the foundation. Save for these 4-ft. pilasters, of which there are nine on each side, both sides of the building for the entire length of 200 ft. are glazed from 6 ft. above the ground level to within 5 ft. of the roof with 10-in. x 14-in. clear glass panes. The sash which hold this glass are of wood construction and stationary.

In the rear of the building a section 20 ft. 6 in. is partitioned off from the shop proper by a brick wall and is further subdivided into an office, armature room, and stockroom. In an adjoining building on the south side of the main shop are located the boiler room and wash room.

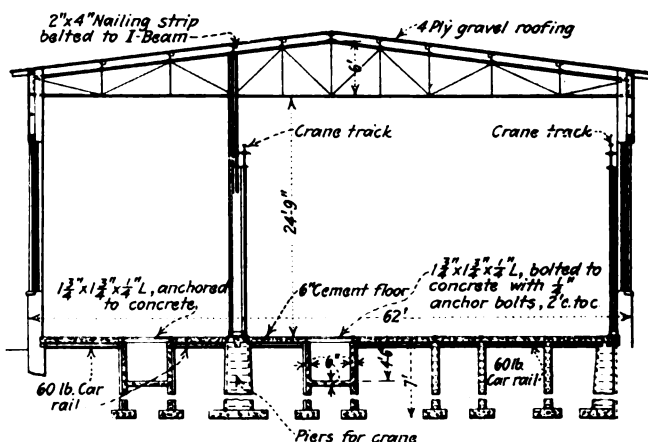
Five tracks enter the shop through the west opening, which is free from obstructions save for the two steel guides which hold the three rolling steel curtains in position when they are down. These curtains, the widths of which are 25 ft., 23 ft., and 13 ft., respec-

tively, are 19 ft. high. Above them corrugated galvanized iron completes the wall construction to the roof.

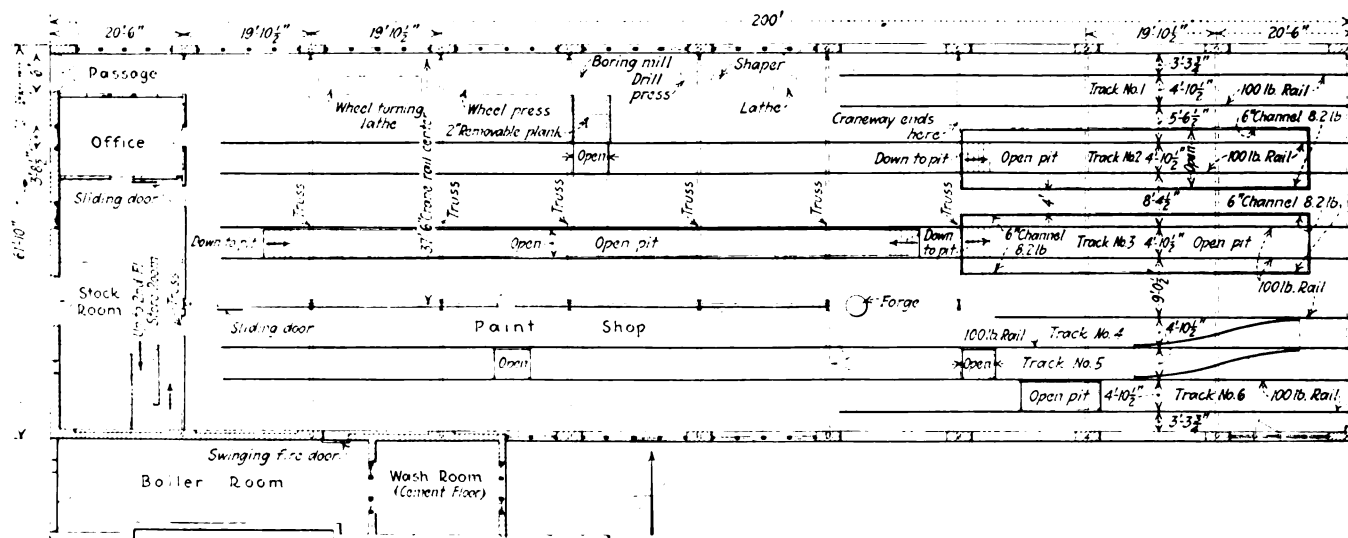
Extending approximately two-thirds the length of the shop is the 37-ft. 6-in. craneway on which a 15-ton electrically-propelled single-hook crane operates. The 40-lb. crane running rail is supported by a 20-in. I-beam mounted on 8-in. H-sections at the outside wall and upon the built-up structural steel columns at the inside end of the runway.

The machine tool equipment installed in the new Oshkosh shop and inspection house consists of a wheel-turning lathe, wheel press, wheel-boring machine, shaper, 28-in. engine lathe, emery wheel, and drill press. These machines are located along the north wall of the building in the space which would be occupied by track No. 1 if it were extended into the craneway. The wheel press and wheel lathe have individual motor drive, while the remainder of the machinery is driven by a single motor through countershafting mounted on brackets secured to the wall columns. The traveling crane serves all of these machines and the routing of a pair of wheels through the shop for turning is simplified by this arrangement. A small hand forge is provided to the right of the entrance to the paint shop, while a work bench occupies the corresponding position on the other side of the room.

An innovation in small property shops is the sanitary, up-to-date washroom provided for the employees. Here complete equipment is provided for cleaning up after doing dirty work under the cars. White en-



Cross-Section of Oshkosh Shop Shows Pit Construction



Floor Plan of Oshkosh Shop and Carhouse

amel bowls, showers and basins give the workman an opportunity to refresh himself before leaving the shop.

While ample light is provided during the daylight hours for the usual work upon the car bodies and roof, each pit is supplied with light circuits with numerous drop cords for inspecting the under-rigging of the car. General night illumination is provided in the form of three 100-watt shaded lamps in each bay on a level with the lower member of the roof trusses. Painting of the ceiling and walls and the sprinkling of lime on the floor are great aids in the general illumination of the interior.

The cost of this construction for a building 200 ft. long by 60 ft. wide by 31 ft. high from the ground to the peak of the gable was \$50,000. This included the laying of the rails and the steel structure incident to supporting the tracks over the open inspection pit near the entrance. The equipment outlined, and which is shown in the accompanying photograph, was purchased for \$24,000. This includes the cost of the 15-ton, 37-ft. span crane.

Average Ride Is 1.65 Miles

Traffic Survey on Surface Lines for Four Most Populous Boroughs in New York Shows that Rides Average Less than 1¾ Miles

THE accompanying tables give some of the figures obtained as the result of a traffic count in New York City made during October and November, 1921, under the direction of the New York Transit Commission. About 200 employees of the various divisions of the commission were engaged in this work, which comprised all of the surface lines in the city with the exception of those in Richmond Borough.

The public had been prepared for the survey by printed notices in English, Yiddish and in Italian, which were posted in the cars for a few days prior to the time when the count was taken on that line. These

notices explained why the count was being undertaken by the Transit Commission, and passengers were requested to answer the questions of those conducting the count.

These men were employed on each car—one to time the operation of the car, because the survey included the question of speed of the car as well as direction of travel of the passengers. The two other representatives distributed and collected the inquiry slips.

The questions asked on this slip were five in number and were essentially as follows:

1. On what car line did you begin this trip and at what street corner?
2. At what street corner did you get on this car? (This answer would be the same as to No. 1, only if the passenger was not a transfer passenger.)
3. At what street corner do you expect to get off this car?
4. At what street corner on a car line is your final destination, and what is that line, i.e., surface, elevated or subway?
5. On this car did you pay a cash fare, a 2-cent transfer, or a free transfer?

Surveys were made of every line in the four boroughs mentioned for one day on each line, and usually for nine round trips. Three of these trips were selected in the morning rush hours, three in evening rush hours and three in the middle of the day. The inquiry blanks were in two colors, so as more easily to distinguish those used during workward travel hours and those used during homeward travel hours. The total number of slips used on each line varied according to the travel. On the important lines from 1,000 to 2,000 slips were collected, and on one line there were 2,391 slips used. The total for the entire period was 122,725.

The main purpose of this count was to determine the direction of traffic flow in the city. For this reason the city was divided into 135 sections, and the tabulation of the slips was conducted to determine not only

AVERAGE RIDES ON STREET SURFACE LINES OF ALL COMPANIES OPERATING IN MANHATTAN, BRONX, BROOKLYN AND QUEENS DURING OCTOBER-NOVEMBER, 1921

Number of Lines	Operating Company		Number of Replies	Workward		Average Ride in Miles	Homeward		Average Ride in Miles	Total Length of Lines in Miles	Number of Replies	Average Ride Workward and Homeward Combined
	Name			Total Length of Lines in Miles	Average Ride in Miles		Total Length of Lines in Miles	Average Ride in Miles				
13	New York Railways		5,633	50.440	1.215	1.183	50.263	1.199	6,076		1.199	
2	New York & Harlem R. R.		868	10.025	1.197	1.089	10.045	1.143	986		1.143	
2	Second Avenue R. R.		977	13.975	1.399	1.487	13.975	1.443	1,010		1.443	
1	Eighth Avenue R. R.		470	9.570	1.457	1.393	9.480	1.425	482		1.425	
2	Ninth Avenue R. R.		670	10.530	1.320	1.283	10.530	1.302	748		1.302	
4	Third Avenue Railway		2,608	23.975	1.563	1.578	23.965	1.571	2,522		1.571	
4	Dry Dock, E. Broadway & Battery R. R.		1,367	12.308	1.422	1.249	12.303	1.335	1,351		1.335	
1	Belt Line Railway Corporation		366	1.795	0.831	0.789	1.795	0.810	346		0.810	
4	42nd St. Manh. & St. Nicholas Ave. Ry.		1,731	16.596	1.329	1.238	16.596	1.284	1,744		1.284	
33	Totals for Manhattan		14,690	149.214	1.308	1.259	148.952	1.284	15,265		1.284	
18	Union Railway		6,889	58.001	1.396	1.382	58.001	1.389	6,373		1.389	
1	Southern Boulevard R. R.		473	5.050	1.328	1.677	5.050	1.502	429		1.502	
1	Westchester Electric R. R.		237	1.205	0.853	0.840	1.205	0.846	321		0.846	
1	Yonkers Railroad		340	1.375	1.374	1.362	1.375	1.368	392		1.368	
6	N. Y. City Interborough Ry.		2,814	25.700	1.542	1.600	25.700	1.571	2,859		1.571	
27	Totals for Bronx		10,753	91.331	1.405	1.421	91.331	1.413	10,374		1.413	
33	The Brooklyn City R. R.		12,174	142.301	1.598	1.670	142.301	1.634	12,719		1.634	
3	Brooklyn Heights R. R.		914	3.063	1.006	1.007	3.063	1.006	929		1.006	
9	Bklyn. Queens Co. & Suburban R. R.		3,417	41.249	1.791	1.826	41.249	1.809	3,345		1.809	
5	Coney Island & Brooklyn R. R.		2,207	28.565	1.797	1.997	28.565	1.897	2,300		1.897	
1	Coney Island & Gravesend Ry.		188	3.223	1.531	1.521	3.223	1.526	149		1.526	
17	Nassau Electric R. R.		6,899	77.251	1.649	1.651	77.251	1.650	7,051		1.650	
3	South Brooklyn Ry.		497	7.522	1.132	1.151	7.522	1.141	417		1.141	
1	Van Brunt & Erie Basin R. R.		202	1.390	0.909	0.896	1.390	0.903	269		0.903	
1	Manhattan Bridge 3-Cent Line		356	2.018	1.755	1.712	2.018	1.734	354		1.734	
73	Totals for Brooklyn		26,854	306.582	1.596	1.647	306.582	1.621	27,533		1.621	
12	New York & Queens County Ry.		4,006	60.013	2.346	2.448	60.013	2.397	4,383		2.397	
2	Long Island Electric Ry.		936	15.510	2.818	2.980	15.510	2.899	865		2.899	
3	New York & Long Island Traction		1,238	16.746	3.616	3.979	16.746	3.797	1,318		3.797	
1	Manhattan & Queens Traction		507	10.460	4.234	4.657	10.460	4.446	533		4.446	
18	Totals for Queens		6,687	102.729	2.715	2.885	102.729	2.800	7,099		2.800	
151	Grand totals for four boroughs		58,984	649.856	1.632	1.669	649.594	1.650	60,271		1.650	

AVERAGE RIDES ON STREET SURFACE LINES IN MANHATTAN AND BRIDGE LOCALS DURING OCTOBER-NOVEMBER, 1921

Lines		Workward				Homeward				Average Ride in Miles Workward and Homeward Combined
No.	Name	Number of Replies	Terminal	Length in Miles	Average Ride in Miles	Average Ride in Miles	Length in Miles	Terminal	Number of Replies	
1	Broadway—7th Ave.	687	South Ferry	5.050	1.096	1.095	4.990	59th St. & 7th Ave.	646	1.096
2	8th St. Crosstown—E. 10th St. Ferry	254	Christopher St. Ferry	2.280	1.067	1.055	2.250	E. 10th St. Ferry	419	1.061
3	14th St. Crosstown	414	W. 23rd St. Ferry	3.270	1.513	1.316	3.303	Clinton & Delancey Sts.	448	1.414
4	7th Ave.—Delancey St.	263	Clinton & Delancey Sts.	4.346	1.601	1.282	4.3663	59th St. & 7th Ave.	363	1.442
5	Columbus—Lenox Ave.	496	65th St. & Columbus Ave.	4.580	1.468	1.520	4.580	146th St. & Lenox Ave.	443	1.494
6	8th St. Crosstown—Delancey	361	Christopher St. Ferry	2.498	1.176	1.227	2.401	Clinton & Delancey Sts.	315	1.202
7	23rd St. Crosstown	727	W. 23rd St. Ferry	2.083	0.953	0.951	2.083	E. 23rd St. Ferry	718	0.952
8	Lexington Ave.	582	Bowling Green	8.600	1.451	1.292	8.580	131st St. & Lex. Ave.	772	1.372
9	116th St.	247	106th St. & Amst. Ave.	2.275	0.987	1.026	2.275	116th St. & E. River	226	1.006
10	Sixth Ave.	372	South Ferry	5.280	0.875	0.926	5.260	59th St. & 6th Ave.	426	0.900
11	Spring & Delancey St.	192	B'way & Spring St.	1.208	0.779	0.856	1.208	Lewis & Delancey Sts.	150	0.818
12	34th St. Crosstown	475	E. 34th St. Ferry	2.350	1.069	1.029	2.350	W. 42nd St. Ferry	482	1.049
65	Lexington—Lenox Ave.	563	23rd St. & Lex. Ave.	6.620	1.761	1.809	6.620	146th St. & Lenox Ave.	668	1.785
Total	Thirteen lines, N. Y. Rys.	5,633		50.440	1.215	1.183	50.263		6,076	1.199
13	4th & Madison Ave.	687	City Hall	8.305	1.725	1.457	8.325	135th St. & Mad. Ave.	827	1.591
15	86th St. Crosstown	181	86th St. & C. Park W.	1.720	0.668	0.721	1.720	E. 92nd St. Ferry	159	0.695
Total	Two lines, N. Y. & H. R.R.	868		10.025	1.197	1.089	10.045		986	1.143
16	Second Ave.	503	B'way & Worth St.	7.725	1.485	1.466	7.725	129th St. & 2nd Ave.	590	1.476
17	First Ave.	474	B'way & Astor Pl.	6.250	1.313	1.508	6.250	125th St. & 1st Ave.	420	1.410
Total	Two lines, 2d Ave. R.R.	977		13.975	1.399	1.487	13.975		1,010	1.443
19	Eighth Ave. R.R. Co., Total	470	Cort. St. & Wash. St.	9.570	1.457	1.393	9.480	159th St.-Polo Grounds	482	1.425
21	Ninth Ave.	341	Canal & Wash. St.	6.370	1.315	1.238	6.370	116th St. & Amst. Ave.	425	1.277
22	53rd St.	329	53rd St. & 7th Ave.	4.160	1.324	1.328	4.160	B'way & 125th St.	323	1.326
Total	Two lines, 9th Ave. R.R.	670		10.530	1.320	1.283	10.530		748	1.302
24	Broadway—145th St.	359	145th St. & Lenox Ave.	2.580	1.301	1.356	2.580	181st & B'way	478	1.329
25	Broadway—Kingsbridge	535	125th St. & E. River	6.780	1.957	2.053	6.770	225th St. & B'way	623	2.005
26	3rd and Amsterdam Ave.	1,390	Post Office	12.540	1.893	1.847	12.540	193rd St. & Amst. Ave.	1,062	1.870
27	125th St. Crosstown	324	125th St. & E. River	2.075	1.102	1.058	2.075	Ft. Lee Ferry	359	1.080
Total	Four Lines, Third Ave. Ry.	2,608		23.975	1.563	1.578	23.965		2,522	1.571
28	Avenue B.	363	Post Office	4.720	1.170	1.306	4.720	59th St. & 1st Ave.	475	1.238
29	Grand St.—Brooklyn	324	Debrosses St. Ferry	3.169	1.887	1.003	3.175	W'msb'g Bridge Plaza	324	1.445
30	Grand St. Crosstown	292	B'way & Grand St.	1.360	0.684	0.775	1.360	Grand St. & E. River	256	0.729
31	Post Office—Brooklyn	388	Post Office	3.059	1.945	1.911	3.048	W'msb'g Bridge Plaza	296	1.928
Total	Four Lines, Dry Dock, E. B'way & Batt. R.R.	1,367		12.308	1.422	1.249	12.303		1,351	1.335
32	59th St. Crosstown—Belt Line Ry.	366	54th St. & 10th Ave.	1.795	0.831	0.789	1.795	1st Ave. & 59th St.	346	0.810
33	Broadway Branch	692	42nd St. & 3rd Ave.	8.260	2.046	1.775	8.260	181st & B'way	613	1.911
34	10th Ave. Branch	426	W. 42nd St. Ferry	4.910	1.505	1.395	4.910	12th Ave. & 125th St.	544	1.450
35	42nd St. Crosstown	409	42nd St. & E. River	1.940	1.029	0.959	1.940	W. 42nd St. Ferry	393	0.994
36	110th St. Crosstown	204	3rd Ave. & 110th St.	1.486	0.735	0.824	1.486	125th St. & Hancock Pl.	194	0.780
Total	Four Lines, 42nd St., Manhattanv. & St. Nicholas Ave. Ry.	1,731		16.596	1.329	1.238	16.596		1,744	1.284
Grand Total	33 lines in Manhattan	14,690		149.214	1.308	1.259	148.952		15,265	1.284
98	Brooklyn Bridge Local	240	Park Row	1.174	1.174	1.174	1.174	Term. B'ldg.—Sand St.	235	1.174
100	Wmsb'g Bridge Local	659	Delancey & Essex St.	1.541	1.536	1.531	1.541	W'msb'g Bridge Plaza	659	1.534

the average length of ride on each line, but also the extent of traffic movement from each of the 135 sections to each of the other sections. From these records data are available for rerouting to accommodate changes in the traffic flow.

Two tables made up as a result of this count are presented, one of companies in the four boroughs and the other of a number of the individual lines in Manhattan Borough. It will be noticed in the former that the shortest rides are in Manhattan Borough and next in the Bronx, then Brooklyn and Queens. It will also be noticed that the average ride in Manhattan is a little more than 1½ miles. This includes the ride on a transfer.

Of course, one reason for the much shorter ride on the surface cars in New York than in other cities is that for long distance travel persons in New York use the rapid transit lines.

The last general survey of this kind made by the New York Transit Commission in New York, though not so extensive as the one just mentioned, was conducted in 1908. At that time the average ride in the different boroughs did not vary greatly from that shown in the recent count.

Theaters and Interurbans Co-operate

AROUND trip fare of one and one-half or one and one-quarter the regular one-way rate is being offered by some of the interurban railways operating out of Indianapolis, Ind., to passengers who desire to come into Indianapolis to attend the theater. The special rate is made good only on the last two trips before theater time and returning that night. A point in making this special rate effective only on the before-theater or before-dinner trains is that local merchants in outlying towns cannot claim that the interurban is offering special inducements to local residents to take their merchandise business into the city.

An innovation in connection with this low-rate theater transportation is that the management of the Shubert-Murat Theater in Indianapolis has added a traveling representative to its staff, whose time is spent in the rural communities to organize theater parties. This theater representative spends six days a week in these small towns and travels entirely on the traction lines. He tries to cover two or three towns a day. After arranging a theater party, he makes all arrangements for a special car, if this is needed.

Co-ordination of Bus and Trolley

Ten Kinds of Desirable Co-ordinated Service Between Trolley and Bus Are Listed and the Possibilities of Each Are Pointed Out—The Bus Is Yet in Its Early Stages and Further Progress Is to Be Expected

By J. A. Emery

Ford, Bacon & Davis, Inc., New York

THE co-ordination of bus and railway services is proclaimed to be the desired answer to the question of the future of city transportation, but aside from some generalities there seems to be no definition of co-ordinated service, and there has been little advance in working out concrete practical plans of co-ordination.

Co-ordination means primarily the avoidance of destructive competition. This is a negative virtue and, of course, a good one, but the main point is that the bus can be made a tremendous help to any electric railway in its business of community transportation and particularly in keeping the conveniences of public modes of travel on a high enough plane to prevent the drift to privately owned vehicles.

The place of the bus as co-ordinated with electric railways is commonly considered to be on routes where the traffic is too light to warrant railway construction. Such locations are generally in the outskirts of cities, and such routes act largely as feeders to the railway.

As a feeder the bus's function is to concentrate traffic to such a degree of density that it can be handled economically by railway lines. In projecting feeder lines, it is not necessary that the feeder be wholly self-supporting, if a profitable fare is obtained on the main line. Railways can in certain cases afford to subsidize bus feeders or to run them at some loss.

While feeder service is a most important use of the bus, there are many other uses fully as important existing in the territory of practically every electric railway. Some of these co-ordinated uses are:

1. Express or local service, jointly with railway lines.
2. Supplementing the service on single-track railway lines, where the railway headway cannot be reduced to meet the demands of traffic.
3. Supplementing the railway carrying capacity in the rush hours.
4. On new routes within the more thickly settled districts, say within 2 miles of the business center, designed to serve districts not contiguous to the railway lines, to supplement the railway through this zone of maximum loading and to reach important delivery points which it is not practicable to reach by direct railway routes.
5. To serve important traffic points like large factories, where waiting cars would obstruct the track and where the greater flexibility of the bus would permit it to make two or more rush-hour trips as compared with one by car.
6. As a substitute for the railway on lines where the track is worn out and the construction of new track is not warranted, or on lines which do not earn operating expenses.
7. For quality service. There is a real demand in all cities for higher priced service than the street cars can afford to give.

8. For pleasure riding. This is one of the most important fields for the bus.

9. For special chartered service.

10. Emergency service.

EXPRESS AND LOCAL SERVICE

On streets where the railway headway is four minutes or less an effective combination of bus and railway service may be obtained by running one facility, preferably the bus, for local service, permitting the railway cars to run without stops.

From the public standpoint this plan has some great advantages. In particular the railway serves to collect passengers in the outer and intermediate residential zones and then to carry them quickly through the more congested inner zones to the business center. At the same time the passengers in the inner zones are inconvenienced because the cars as usually operated are crowded through the inner zones and the local service gives them space of their own. There is a further advantage in that in the inner zones, where the vehicle traffic is heavy, it is much safer and pleasanter for passengers to get on or off at the curb, as may be done with the bus.

While individual lines operating on four-minute headway are not common outside of large cities, there are many cases where two or more lines converge on one street at a distance of 2 or 3 miles from the business center, giving a total service of fifteen or more cars per hour. With joint railway and bus operation, bus local service would have to be at least as frequent as ten cars per hour, and the railway service could hardly be reduced below twelve, making a total of twenty-two units per hour to be operated as compared with fifteen. However, the railway speed would be increased by fully 20 per cent, reducing the number of cars in operation on the section by 20 per cent, and the cost of operation of a one-man bus is substantially less than that of a two-man car such as is used on most heavy traffic streets.

If the principle be accepted that better service attracts more business, then this plan of operation should get a further credit, for it will bring the outlying districts from three to ten minutes closer to the business center, dependent on the length of the express run, and affords a more attractive local service in the congested zones.

An enlargement of this plan of operation on long lines with heavy travel would be to run express service on the railway for the entire distance, with stops not less than three-quarters of a mile apart and with buses doing the local work and transferring to and from the cars at the express stops. This arrangement is similar to that in the four-track section of the New York subway.

On single-track lines, where the traffic at some

periods requires more service than can be operated properly on single track, buses can be used to good advantage to supplement the railway service, thus obviating the necessity for second tracking or for relocating turnouts. In this case the buses should be spaced between the cars on that part of the line where the load is gathered, and care must be taken to prevent bunching of service at such points, due to the cars waiting on turnouts.

An important feature of this plan is that the route of the buses in the business district can be extended beyond the railway route if desired to reach important traffic points not reached by the railway route.

SUPPLEMENTING RAILWAY SERVICE IN RUSH HOURS

The bus can be made a valuable adjunct of the railway in handling rush-hour traffic. In cities of more than 200,000 population and in some smaller cities there are main arteries on which the track capacity is fully taxed and, therefore, increases in service cannot be made when needed. The bus as an adjunct can be used on such streets where tracks exist, but a great field of usefulness is on parallel streets not occupied by tracks. When it is proposed to run buses on such streets the selfish plea is sometimes set up that these streets must be reserved for private automobiles. As observed in several representative localities, private cars carry on an average less than two persons per car. It is, therefore, preposterous to devote a valuable thoroughfare to such wasteful use when the great body of the public is confined to the remaining overburdened streets. The streets should be used for the greater general good.

Taking into account the necessary carhouse and shop facilities, substations and feeders, but not the track, the investment in a double-deck car seating fifty-five passengers is about \$25,000, or about \$450 per seat. A good single-deck bus seating twenty-eight involves an investment of about \$10,000, or \$350 per seat. With a standing load equal to the seated load the electric car costs as much per passenger as the bus with half as many standing as seated. With a double-deck bus seating about sixty-five the investment is only \$200 per seated passenger.

When the extra cars are on the street in the rush hours it is hard to maintain schedules on many crowded sections of track. It is a practicable matter in many such cases to take the point off the peak with buses. Due to the flexibility of buses they can be routed to avoid the most congested corners and to use streets which cannot be used by the railway.

AUXILIARY ROUTES IN THICKLY SETTLED ZONES

One of the most trying and baffling of sights to the electric railway man is to stand near the boundary of his central business district and see the swarms of pedestrians, particularly at the rush hours. There is no quarrel with those who walk for their health, but a large percentage of these people would ride if the transportation company had the goods to offer. What are the goods?

1. A rate of fare in some measure proportioned to the length of the ride.

2. Car capacity. During the rush hours it is generally hard to get on cars leaving the business district and very uncomfortable when once on.

3. In the thickly settled zones, as the railway lines cannot run on every street, there are many people for

whom the combined ride and walk is less convenient than a direct though longer walk between business district and home.

How two of these problems can be helped by co-ordinated bus service is shown by the following diagram:

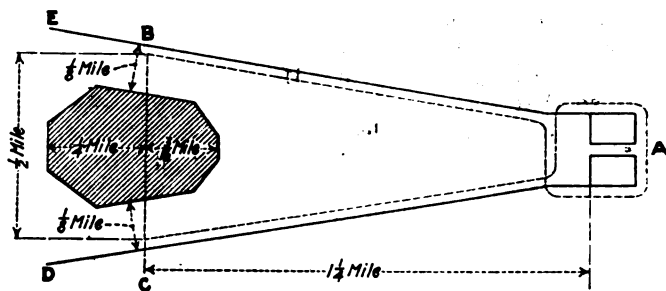


Diagram Showing Possibilities of Auxiliary Route in Thickly Settled Zones

AE and AD represent radiating railway lines. ABC is a bus route operated in both directions. The population in the shaded area live within walking distance of the edge of the business center and to use the street cars they must walk from $\frac{1}{4}$ to $\frac{1}{2}$ mile. The result is that a large number walk, making the average rides per capita low.

The proposed bus route if operated both ways on ten-minute headway would require the regular patronage of about 3,000 population with transportation expenditures of \$18 a year to support it. The shaded area, which may be considered as served most conveniently by the bus line, contains 40 acres, and to accommodate 3,000 population would require a density of 43 per acre, which is not an unusual figure for districts within $1\frac{1}{2}$ miles of a business center or more than 100,000 population.

A bus route of this character would further provide added capacity past the maximum load points on the two main railway lines. There are many cases where outlying local business centers occur at points like B and C. In such cases the bus route would accommodate cross traffic, which is seldom sufficient in volume to warrant a railway line.

AUXILIARY SERVICE TO IMPORTANT TRAFFIC POINTS

At large factories, ball grounds and other important traffic points extra cars are often provided. Unless the traffic is large enough to warrant spur tracks, these extra cars must wait on the main line and generally interfere with schedules. Buses are ideally adapted to such extra service. They can wait without impeding other traffic; they can be routed when desired to avoid the congested business center, and in many cases by reason of routing flexibility they can make two trips where street cars could only make one. Further, they can be made to accommodate different points on different days as needed.

SUBSTITUTION FOR RAILWAY LINES WHICH DO NOT EARN OPERATING EXPENSES

If the average operating expenses on a given railway be, say, 40 cents per car-mile (including replacements), there will be found many lines or routes earning substantially less. The traffic on such light traffic routes could be handled readily by one-man buses, the total cost of service being not more than 30 cents per bus-mile, with labor at 60 cents per hour. It would often

pay to substitute buses for cars on such lines if the paving be suitable and particularly if the railway track be below the average. One-man cars can be operated at about the same cost as buses if the track is in good condition, but if the investment in track be taken into consideration, bus operation is generally cheaper. In case of substitution, the net salvage on the track is small so that the railway would still have to carry fixed charges on a large part of it. If the track is in good shape, so that the maintenance cost is not above the average and so that single-truck one-man cars can be operated satisfactorily, then there is no advantage in the use of buses. If, however, new one-man cars have to be purchased, it would generally be preferable to substitute buses.

Each case of this kind should be carefully figured out. It is safe to say that there is not an electric railway of importance in the United States which does not have one or more lines on which it would pay to substitute buses for cars.

QUALITY SERVICE

It is a great mistake for the public as well as for the railway to attempt co-ordinated bus service at the same rates of fare as the railway in every case for this seriously curtails the usefulness of the bus in the public service.

In one particular a higher rate of fare will enable bus lines to be established in more thinly settled territory.

Of fully as much importance, however, is the fact that a higher rate of fare will enable the buses to give a better quality of service for which there is a real demand. This may take the form of a seat for every passenger, or of shorter headways, or of more convenient deliveries in the business district. The consideration of rate of fare is secondary to that of service and there is plenty of evidence that a considerable proportion of the people are willing and glad to pay more than the regular railway fare to secure better accommodations. It is hardly possible to differentiate the service as between lines or cars on a street railway, but with co-ordinated bus service a great field in this particular is opened.

PLEASURE RIDING

Analyses of traffic of bus lines operating double-deck buses indicate that as much as 25 per cent of the travel is for pleasure. Less than one-half of the families in the United States own automobiles, and in the larger cities the proportion is much smaller, running down to one in four or five. The majority of city dwellers therefore have no way of participating in the enjoyment of parks and drives. Every city has drives which it is practicable to make available to the public by the use of motor buses. Such lines can be operated as regular all-day routes if there be regular traffic demand, but it is also feasible to operate them only on nights, afternoons, Sundays and holidays in summer. There is a ready use for the buses in winter to supplement the railway service in the rush hours.

SPECIAL CHARTERED AND EMERGENCY SERVICES

In years past electric railways did an important business in chartering cars. With the much greater traveling range of the motor bus, there should be a great field for this class of service. In securing rights to operate buses, the freedom to cultivate this business

should be provided for. School and hotel service comes under this head.

The bus will become invaluable to help out electric railways in handling large crowds to and from special points, in carrying special crowds from railway stations to sports or conventions, and in operating special relief routes when the regular routes are interfered with by parades or otherwise. A further use of this nature is to have one or more buses at a central dispatching point to inject into the schedule when a car becomes overdue on account of accident or other case, or when unexpected loads present themselves.

NECESSITY FOR RAILWAYS TO KEEP ABREAST OF BUS DEVELOPMENTS

Electric railway managements owe it to their stockholders and themselves to keep abreast of bus developments with first-hand knowledge and experimentation rather than hearsay opinion. The bus is in an early stage of development. While its field may be somewhat limited at present, a small gain in efficiency will put it on a par with electric railways under any conditions and it behooves the street railway industry to keep its eyes open.

Good-Will Publicity During Construction Work

CONSPICUOUS signs have been placed in the streets of Little Rock by the Arkansas Central Power Company in an endeavor to win the good will of the public at a time when a certain amount of inconvenience is experienced due to torn-up streets. In this way the



Sign Displayed in Little Rock, Ark., to Win Public Good Will During Track Construction Work

company is taking advantage of the opportunity of telling the public what is being done when street construction work is under way.

One of these signs which was used in connection with trackwork on Markham Street and which is shown in the illustration reads in large letters:

"This work is being done within six weeks in order to inconvenience the public as little as possible."

Emphasis was also placed on the fact that \$50,000 was being spent and would go to Little Rock labor. The quantities of various materials required were listed so as to interest the public by pointing out the extent of the undertaking.

A similar sign was displayed during construction on East Fourteenth Street, calling attention to the year's work in this manner:

"When this job is finished, it will complete the work this company has been doing in the last year to improve the street car tracks and pavements and which has cost \$275,000. This includes the relaying of 4 miles of tracks and repaving of one-third of all the pavement between our tracks in Little Rock."

The Markham Street job, which was started Aug. 14 and completed the night of Sept. 22, consisted of the removal of one mile of double track and two blocks of single track, removal of pavement and concrete foundation under the track, excavation, reballasting and relaying of track, putting in of concrete foundation and Warrenite paving between the track and 2 ft. on each side. Traffic was continued during construction by using one track at a time. The city made the street a one-way street and the company co-operated so that no cross streets were blocked for more than two hours at a time. The cost of the extra traffic policemen required was paid by the company.

The East Fourteenth Street job consisted of the removal of 3,500 ft. of track, together with the work of excavation, reballasting and paving with concrete between tracks and for 2 ft. on each side. This section was practically at the end of the line, and traffic over the portion of the line being rebuilt was suspended for the two weeks required to complete the work.

During the time that rail service was interrupted, buses were operated by the company on a parallel street one block away. These buses were operated on the same schedule as that which had been maintained by the cars and free transfer privileges were extended to passengers in both directions.

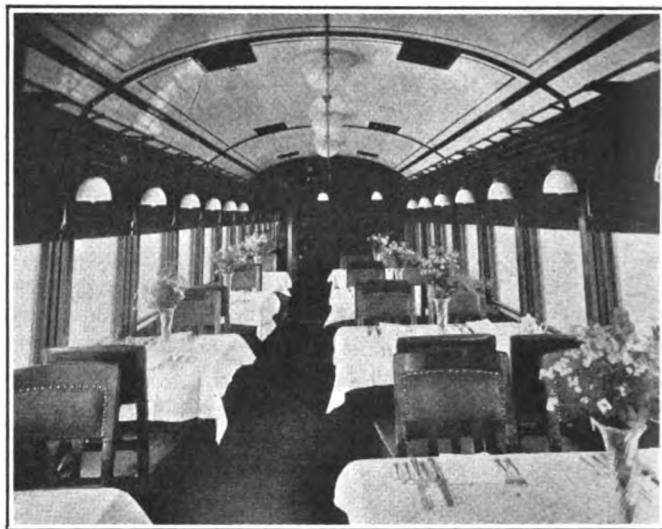
Latest Type North Shore Diner

New Cars Are Designed for This Purpose Exclusively and Arrangements Follow Closely Those of Steam Road Diners—Service Has Proved Popular

THE Chicago, North Shore & Milwaukee Railroad began its dining car service with a design of car that could be used both as a diner and as a club car. People who bought their meal en route were permitted to remain in the car for the entire journey, and the car was also used purely as a club car on some runs between the meal hours. But the patronage of the diner service has grown to such an extent that several sittings are served and people come in from and go back to their seats in other cars as on steam roads. Hence it was necessary to provide some diners of larger capacity than the combination club-diner cars. The newest type diners are planned exclusively for dining service and are operated only on the meal-hour runs.

The new diners are four-motored cars of characteristic North Shore design and weighing 102,000 lb. The exterior resembles very closely the North Shore passenger cars with the exception of the ventilators and flues on the top over the kitchen compartment. The North Shore green color is used on the outside, with the

ends of the car painted orange, as is done on all cars used in "limited" service. The interior finish is in natural mahogany, with which the chairs and tables harmonize. The ceiling is of steel finished in a light cream color. A heavy nap green plush carpet adds to the appearance of the interior. In place of the heavy leather-stuffed armchairs previously used in the club-



Pleasing Appearance Marks Interior of New Dining Cars of North Shore Line

diners, neat, straight chairs without arms and with leather upholstered seats and backs have been provided.

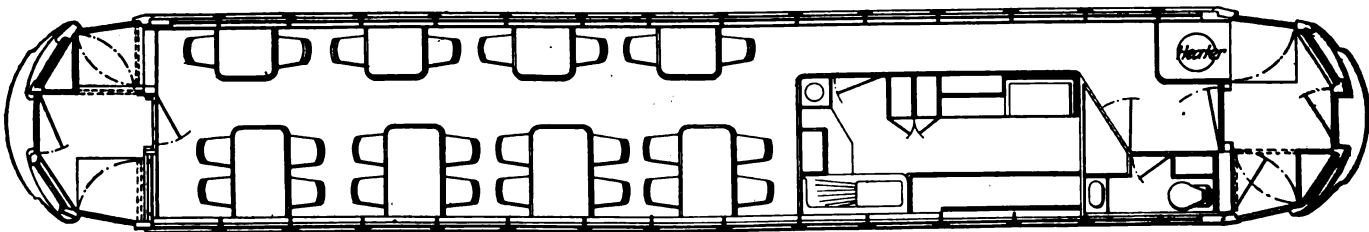
The heating facilities of the car are identical with those in the observation cars described on page 56 of the ELECTRIC RAILWAY JOURNAL for July 14, 1923.

The kitchen represents the utmost in convenience and compactness and contains every cooking utensil and facility necessary in the preparation of palatable food. Service from the kitchen to the waiters is made through a window in the panel of the kitchen on the aisle side. This, to a large extent, eliminates the confusion encountered in dining kitchens where the waiters must enter the kitchen to secure the orders.

There are now fourteen trains operating between Milwaukee and Chicago giving de luxe service which carry special equipment either in the form of diners or observation cars. Six of these trains are in addition to the regular hourly service between the two cities.

Dimensions and other data are given below:

GENERAL DIMENSIONS			
Length over all.....	55 ft. 3½ in.	Bulkhead door opening.....	26 in.
Length over train door posts.....	53 ft. 6½ in.	Seating capacity.....	24
Length over body.....	44 ft. 2½ in.	Truck centers.....	32 ft. 8 in.
Length of platform.....	5 ft. 6½ in.	Wheelbase.....	7 ft. 0 in.
Extreme width.....	9 ft. 0 in.	Wheel diameters.....	36 in.
Rail to top of trolley boards.....	12 ft. 7½ in.	Post centers.....	35 in.
Rail to bottom of side sills.....	3 ft. 4¼ in.	Type of roof.....	Arched
Rail to first step.....	16¼ in.	Interior finish.....	Mahogany
Width over side sheathing.....	8 ft. 8 in.	Type of heater.....	Hot water and electric
Vestibule door opening.....	29 in.	Type of ventilators.....	Garland C-I
Train door opening.....	26½ in.	Sash.....	Brass



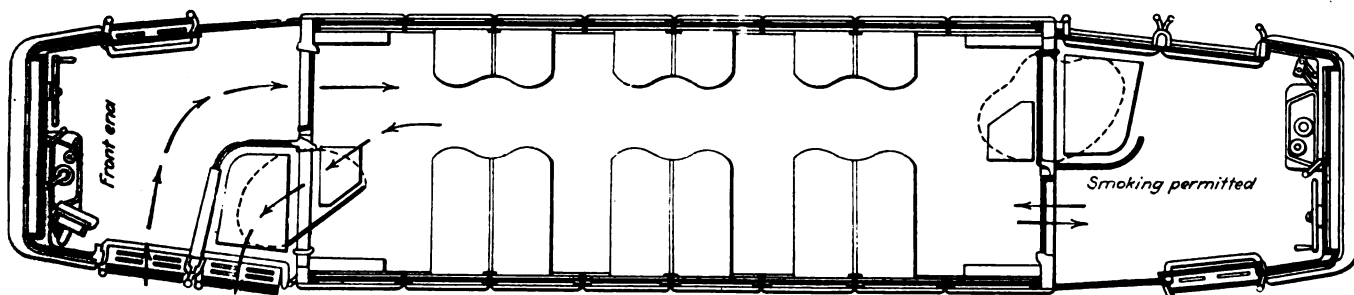
Floor Plan of Latest North Shore Diner Showing Compact Kitchen Layout and General Arrangement

One-Man Cars in Sweden

Separate Entrance and Exit Doors Are Provided—Cars Are Double-Ended, with Bulkheads, and Rear Platform Is Used for a Smoking Compartment

ONE-MAN cars have been introduced into the service of Malmö, Sweden. A description of the type used is given in *Verkehrstechnik* for July 1, 1923. In order to reduce the labor of the motorman, several interesting features have been incorporated. The cars are of a double-end type and incoming and outgoing passengers are kept separate by having distinct entrance and exit doors and a pipe barrier on the platform. The entrance to the platform is always open, but hinged end doors are provided between the platform and the body of the car. The operation of these doors is controlled by the motorman. The exit door when unlocked is opened by the passenger pushing on it, and it closes automatically after the last passenger leaves the step of the car. The various movements and interlocking are controlled by the motorman from the operating end. By turning a lever 30 deg. toward the front, a stop signal light is displayed, the exit door is unlocked and the fare box is swung into a convenient position for receiving fares. At night a number of lamps for illuminating the platform are also switched on.

When passenger interchange has finished, a return of the lever again locks the exit door, swings the fare box back and extinguishes the lights on the platform.



Type of One-Man Car Used in Malmö, Sweden

This entire operation is accomplished mechanically without the use of compressed air or electricity.

This arrangement of doors between the platform and car body provides a convenient compartment for smokers in the rear. On most of the lines where this car is operated, passengers board and alight at each stop and the double door arrangement has been very successful. The fare boxes automatically sort copper and silver coins and may be carried from end to end or taken off the car. On lines where boarding and alighting are rarely done simultaneously standard cars are being used, and the exit as well as the entrance is through the same door.

One-man cars are also operated in Augsburg. They were introduced in order to meet the increased operating costs. The city is a trade and manufacturing center with a population of 160,000. The car lines are single track, with a total length of 18 miles. Sidings are provided about every 0.4 mile. Standard cars were first operated by one man in 1922, but as the rush hour traffic is quite heavy, two men are used between the hours of 6 to 8, 11 to 2 and 4 to 8. When operated by one man the rear door is kept closed and

entrance and exit are through the front door opening. The introduction of one-man operation has reduced the schedule speed, but by increasing the number of cars the public is better served and the operation is much more economical.

One-man cars operated in the city of Brandenburg are equipped with automatic ticket selling machines. Upon entering the passenger drops a token into the box and receives his ticket. The tokens are of a circular design and have a groove on each side to fit into a special slot in the machine.

Tokens are made in two different colors, yellow and white. Yellow tokens can be purchased from the motorman upon entering, and the white kind can be obtained in advance at a 20 per cent reduction in cost. The tickets permit a single transfer and must be punched in order to be valid.

Chicago Elevated Operates the Greatest Number of Trains on Single Track

ACCORDING to the latest available figures, the maximum number of trains operated in a single direction on a single track is on the Chicago Elevated between Grand Avenue and Chicago Avenue northbound during the evening rush hours. Between 5:15 and 6:15 there are seventy-one trains, of which sixty-six are operated by the Elevated and five by the Chicago, North Shore & Milwaukee Railroad.

The second greatest number of trains scheduled

or operated is at Charing Cross Station of the Metropolitan District Railway, London. At this point there are forty-one trains westbound during the maximum hour. Next in point of density is the operation of the Hudson & Manhattan Railroad from the Hudson Terminal, New York City, where there are forty trains per hour over a single track. At several points the Euston & Hampstead section of the London Electric Railway operates thirty-five trains an hour in one direction. At Times Square, New York City, the Interborough Rapid Transit Company has thirty-three scheduled trains in an hour, although this schedule is rarely attained.

When the number of cars per hour is considered, the Chicago Elevated leads again, but by a smaller margin. There the greatest number of cars passing a single point during the maximum hour is 387. At Times Square, the maximum schedule of the Interborough calls for 330 cars per hour. The Metropolitan District Railway operates eight-car trains, giving 328 cars per hour west bound at Charing Cross. At Hudson Terminal the number of cars per train is also eight, making a total of 320 cars per hour at that point.

Pass Increases Earnings 6 per Cent

Santa Barbara, Tourist City of 30,000, Has Had Weekly Pass for Twelve Months and Has Had 25 per Cent Increased Riding

BY W. E. ERWIN

Superintendent Santa Barbara & Suburban Railway,
Santa Barbara, Cal.

THE weekly pass was inaugurated on the lines of the Santa Barbara & Suburban Railway, Santa Barbara, Cal., Dec. 11, 1922, after the approval of the Railroad Commission of the State of California.

The pass is sold for \$1 and permits unlimited riding between Sunday midnight and the succeeding Sunday midnight and is transferable. Passes are placed on sale Friday prior to the week for which they are valid and remain in the hands of the car operators until the following Wednesday. Pass sales at present are averaging about 635 per week, or one pass for every forty-five population.

Santa Barbara is primarily a tourist city. Its regular population of 30,000 is augmented during the summer and winter months by a great many transient visitors. It has no industrial and manufacturing plants and the street railway is not called upon to serve heavy peak loads so common to cities of such character. Distances from the business center are short, and the tendency to walk or accept the invitation of some friendly automobilist was impelling when the cost of the street car ride was 8 cents cash or 7-cent ticket fare purchased in strips of five coupons. These fares were approved by the State Railroad Commission and went into effect Nov. 1, 1920, and immediately resulted in a definite loss of patronage with but a slight increase in gross revenues.

Facing such problems as these, the management decided to install the weekly pass, which has now been in operation for twelve months. The Santa Barbara & Suburban Railway operates 100 per cent safety cars. In addition it operates three Moreland safety coaches into territory not served by the street railway lines and used to supplement and feed the lines of the railway. Passes are sold and accepted for transportation on the bus lines and transfers issued between buses and street cars. Ninety-five per cent of all passes are sold by car operators and bus drivers, who are enthusiastic as to the pass as it greatly speeds the traffic and lightens the burden of fare collection. The color of the pass card is changed weekly, and in addition to this a large numeral designates the week during which it is valid.

With the public there is no question as to its popularity. Car riding has increased 25 per cent and gross earnings 10 per cent, of which at least 6 per cent is directly attributable to the pass, without additional operating expense. In other words, the car riding index since the installation of the pass has been raised from 68.6 in 1922 to 86 in 1923.

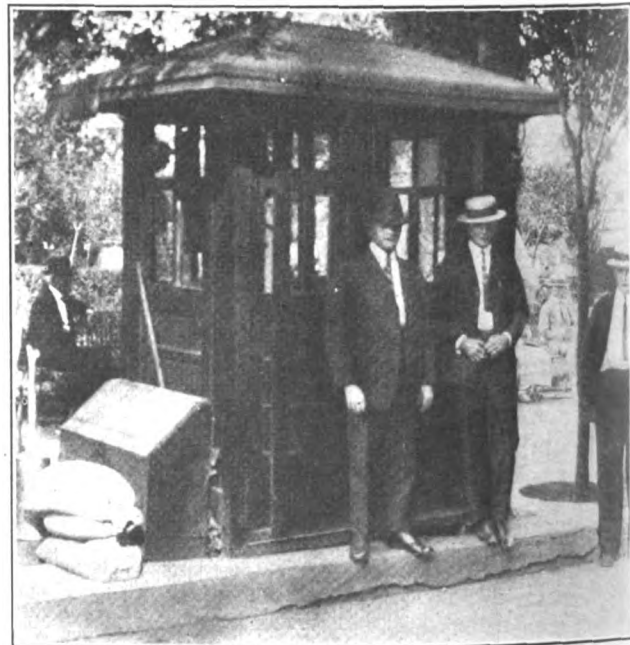
The proportionate revenues derived from the different forms of fare are: 8 cents cash, 40 per cent; 7-cent ticket, 38 per cent, and weekly pass, 21 per cent. The traffic represented by these three forms of fare is as follows: 8 cents cash, 32 per cent; 7-cent ticket, 34 per cent, and weekly pass, 33 per cent. Accurate account of pass riders is kept daily and represents 3.89 pass rides per day per pass. As the longest car ride is 3½ miles, it has been approximated that the pass rider averages less than eight blocks per ride.

The pass has naturally produced a lower revenue per revenue passenger ride since its installation, as the revenue per revenue passenger during the year prior to its installation was 7.19 cents, while at present it is 6.1 cents. Further analysis of fare earnings shows that regular patrons who formerly purchased 7-cent tickets now use the pass. This has resulted in a decrease of 27.4 per cent in this form of fare, while the 8-cent cash fare shows a gain of 10 per cent, which no doubt proves that the pass rider does not ride alone during off-peak periods.

The management is well pleased with this form of fare and believes it has increased the good will of its patrons, as the demand for lower cash fares has subsided.

Dispatcher's Booth Serves as Information Bureau*

ON THE lines of the El Paso Electric Railway an inspector is constantly on duty at the downtown plaza. His duty is not only to dispatch the car, but also to serve as an information bureau and guide to the public and tourists seeking assistance. His headquarters are in a booth, which is equipped with telephone, fire extinguisher, block and tackle for picking



The Booth Is Equipped with Telephone and Accessories for Use in Emergencies

up trolley wires, rubber gloves and, for the convenience of the public, a map of the city and a city directory. This booth is shown in the accompanying illustration. Several booths of similar type are installed at various places in the city.

The merit and bonus system of the Los Angeles Railway, whereby a Christmas bonus of \$60 a year, based on a rate of \$5 per month, is granted to trainmen who have a specified standing on the merit system, as described in past issues of this paper, has been extended by the award of additional prizes, ranging from \$10 to \$100, to top-notch trainmen in each division.

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

Combined Shop and Carhouse for Small Property

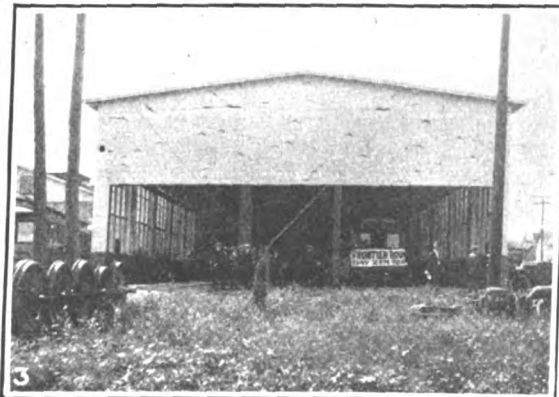
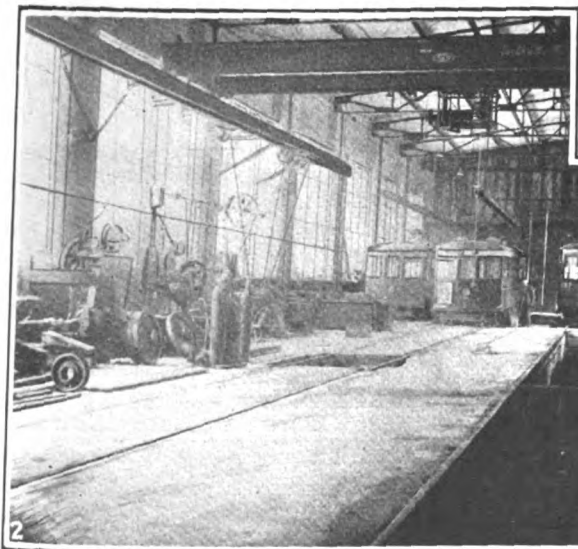
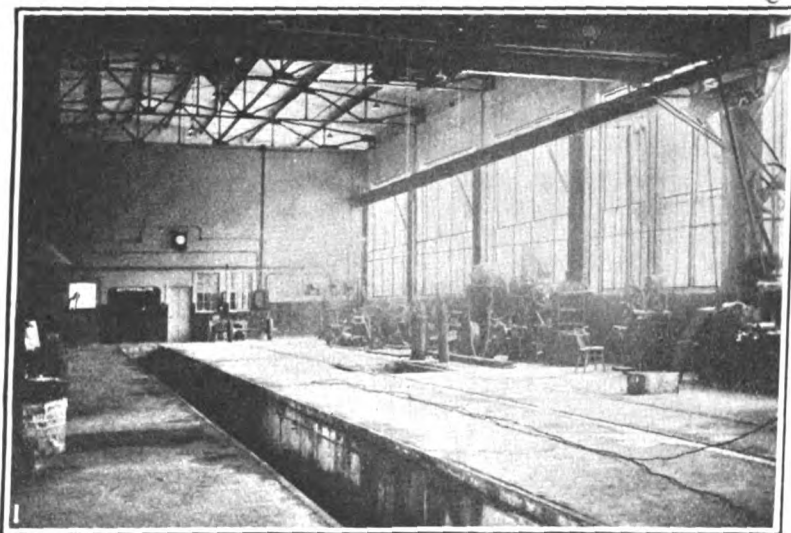
Fireproof Construction, Open Pit, Inclosed Paint Shop, Overhead Traveling Crane and Abundant Daylight Are Features of the New Oshkosh Shop—Details of Construction Are Given

TO REPLACE the old frame shop and carhouse destroyed by fire, the Eastern Wisconsin Electric Company has recently completed a building of fireproof construction upon the site of the old structure in Oshkosh, Wis. In designing this new plant considerable thought was given to the various features of overhaul and repair incident to the successful maintenance of cars in order that these duties might be performed with a minimum of labor and time. While providing adequate machinery and equipment for this work, the fact was not lost sight of that the building must also serve as a carhouse for the storage and cleaning of the cars during the night.

DETAILS OF CONSTRUCTION

The building has a concrete floor and brick rear and side walls below the windows. The roof and side walls above the windows are of hemlock planking. The floor, of reinforced-concrete construction, is broken up into several

the outside tracks, the intervening floor is carried only to within 1 ft. of the rails. This main pit, located, as it is, just inside of the entrance doors, is used for inspection and general under-rigging repairs which can be made without removing the part from the car. The elongated single track pit previously referred to is used for the general overhaul and repairs to the cars such as necessitate the use of a traveling overhead crane. Four



No. 1—New Oshkosh Shop Showing the Arrangement of Machinery Along the North Wall. No. 2—Cars in Position Over Inspection Pits. The Traveling Crane and Rolling Steel Doors at Front of Shop Are Seen. No. 3—Extensive Use of Windows in Side Walls and Galvanized Corrugated Iron Sheetting Above the Rolling Steel Door Openings

sections by the pits, of which there are seven, located at various points throughout the layout.

One 4-ft. pit extends the length of the building. The front 60 ft. of this pit is widened to 22 ft. and extends from 1 ft. on one side of track No. 2 to 1 ft. on the opposite side of track No. 3, as seen in the accompanying floor plan. The track, as well as the floor between these two tracks, is carried on a steel I-beam structure so designed as to leave the space between the rails of each track free from obstruction. As is the case on

other single-track pits, which vary in length from 6 ft. to 12 ft., are located at advantageous points on each of the other tracks in order that repairs or inspections may be carried on without waiting for space over the main pit.

The building itself is divided into two sections, one of which is approximately twice the size of the other, by a line of structural steel columns which serve as a support for the rail on which one end of the overhead traveling crane runs. Advantage has been taken of this

amel bowls, showers and basins give the workman an opportunity to refresh himself before leaving the shop.

While ample light is provided during the daylight hours for the usual work upon the car bodies and roof, each pit is supplied with light circuits with numerous drop cords for inspecting the under-rigging of the car. General night illumination is provided in the form of three 100-watt shaded lamps in each bay on a level with the lower member of the roof trusses. Painting of the ceiling and walls and the sprinkling of lime on the floor are great aids in the general illumination of the interior.

The cost of this construction for a building 200 ft. long by 60 ft. wide by 31 ft. high from the ground to the peak of the gable was \$50,000. This included the laying of the rails and the steel structure incident to supporting the tracks over the open inspection pit near the entrance. The equipment outlined, and which is shown in the accompanying photograph, was purchased for \$24,000. This includes the cost of the 15-ton, 37-ft. span crane.

Average Ride Is 1.65 Miles

Traffic Survey on Surface Lines for Four Most Populous Boroughs in New York Shows that Rides Average Less than 1¾ Miles

THE accompanying tables give some of the figures obtained as the result of a traffic count in New York City made during October and November, 1921, under the direction of the New York Transit Commission. About 200 employees of the various divisions of the commission were engaged in this work, which comprised all of the surface lines in the city with the exception of those in Richmond Borough.

The public had been prepared for the survey by printed notices in English, Yiddish and in Italian, which were posted in the cars for a few days prior to the time when the count was taken on that line. These

notices explained why the count was being undertaken by the Transit Commission, and passengers were requested to answer the questions of those conducting the count.

These men were employed on each car—one to time the operation of the car, because the survey included the question of speed of the car as well as direction of travel of the passengers. The two other representatives distributed and collected the inquiry slips.

The questions asked on this slip were five in number and were essentially as follows:

1. On what car line did you begin this trip and at what street corner?

2. At what street corner did you get on this car? (This answer would be the same as to No. 1, only if the passenger was not a transfer passenger.)

3. At what street corner do you expect to get off this car?

4. At what street corner on a car line is your final destination, and what is that line, i.e., surface, elevated or subway?

5. On this car did you pay a cash fare, a 2-cent transfer, or a free transfer?

Surveys were made of every line in the four boroughs mentioned for one day on each line, and usually for nine round trips. Three of these trips were selected in the morning rush hours, three in evening rush hours and three in the middle of the day. The inquiry blanks were in two colors, so as more easily to distinguish those used during workward travel hours and those used during homeward travel hours. The total number of slips used on each line varied according to the travel. On the important lines from 1,000 to 2,000 slips were collected, and on one line there were 2,391 slips used. The total for the entire period was 122,725.

The main purpose of this count was to determine the direction of traffic flow in the city. For this reason the city was divided into 135 sections, and the tabulation of the slips was conducted to determine not only

AVERAGE RIDES ON STREET SURFACE LINES OF ALL COMPANIES OPERATING IN MANHATTAN, BRONX, BROOKLYN AND QUEENS DURING OCTOBER-NOVEMBER, 1921

Operating Company			Workward			Homeward			Average Ride
Number of Lines	Name	Number of Replies	Total Length of Lines in Miles	Average Ride in Miles	Average Ride in Miles	Total Length of Lines in Miles	Number of Replies	Workward and Homeward Combined	
13	New York Railways	5,633	50.440	1.215	1.183	50.263	6,076	1.199	
2	New York & Harlem R. R.	868	10.025	1.197	1.089	10.045	986	1.143	
2	Second Avenue R. R.	977	13.975	1.399	1.487	13.975	1,010	1.443	
1	Eighth Avenue R. R.	470	9.570	1.457	1.393	9.480	482	1.425	
2	Ninth Avenue R. R.	670	10.530	1.320	1.283	10.530	748	1.302	
4	Third Avenue Railway	2,608	23.975	1.563	1.578	23.965	2,522	1.571	
4	Dry Dock, E. Broadway & Battery R. R.	1,367	12.308	1.422	1.249	12.303	1,351	1.335	
1	Belt Line Railway Corporation	366	1.795	0.831	0.789	1.795	346	0.810	
4	42nd St. Manh. & St. Nicholas Ave. Ry.	1,731	16.596	1.329	1.238	16.596	1,744	1.284	
33	Totals for Manhattan	14,690	149.214	1.308	1.259	148.952	15,265	1.284	
18	Union Railway	6,889	58.001	1.396	1.382	58.001	6,373	1.389	
1	Southern Boulevard R. R.	473	5.050	1.328	1.677	5.050	429	1.502	
1	Westchester Electric R. R.	237	1.205	0.853	0.840	1.205	321	0.846	
1	Yonkers Railroad	340	1.375	1.374	1.362	1.375	392	1.368	
6	N. Y. City Interborough Ry.	2,814	25.700	1.542	1.600	25.700	2,859	1.571	
27	Totals for Bronx	10,753	91.331	1.405	1.421	91.331	10,374	1.413	
33	The Brooklyn City R. R.	12,174	142.301	1.598	1.670	142.301	12,719	1.634	
3	Brooklyn Heights R. R.	914	3.063	1.006	1.007	3.063	929	1.006	
9	Bklyn, Queens Co. & Suburban R. R.	3,417	41.249	1.791	1.826	41.249	3,345	1.809	
5	Coney Island & Brooklyn R. R.	2,207	28.565	1.797	1.997	28.565	2,300	1.897	
1	Coney Island & Gravesend Ry.	188	3.223	1.531	1.521	3.223	149	1.526	
17	Nassau Electric R. R.	6,899	77.251	1.649	1.651	77.251	7,051	1.650	
3	South Brooklyn Ry.	497	7.522	1.132	1.151	7.522	417	1.141	
1	Van Brunt & Erie Basin R. R.	202	1.390	0.909	0.896	1.390	269	0.903	
1	Manhattan Bridge 3-Cent Line	356	2.018	1.755	1.712	2.018	354	1.734	
73	Totals for Brooklyn	26,854	306.582	1.596	1.647	306.582	27,533	1.621	
12	New York & Queens County Ry.	4,006	60.013	2.346	2.448	60.013	4,383	2.397	
2	Long Island Electric Ry.	936	15.510	2.818	2.980	15.510	865	2.899	
3	New York & Long Island Traction	1,238	16.746	3.616	3.979	16.746	1,318	3.797	
1	Manhattan & Queens Traction	507	10.460	4.234	4.657	10.460	533	4.446	
18	Totals for Queens	6,687	102.729	2.715	2.885	102.729	7,099	2.800	
151	Grand totals for four boroughs	58,984	649.856	1.632	1.669	649.594	60,271	1.650	

AVERAGE RIDES ON STREET SURFACE LINES IN MANHATTAN AND BRIDGE LOCALS DURING OCTOBER-NOVEMBER, 1921

Lines		Workward				Homeward				Average Ride in Miles Workward and Homeward Combined	
No.	Name	Number of Replies	Terminal	Length in Miles	Average Ride in Miles	Average Ride in Miles	Length in Miles	Terminal	Number of Replies		
1	Broadway—7th Ave.	687	South Ferry	5.050	1.096	1.095	4.990	59th St. & 7th Ave.	646		1.096
2	8th St. Crosstown—E. 10th St. Ferry	254	Christopher St. Ferry	2.280	1.067	1.055	2.250	E. 10th St. Ferry	419		1.061
3	14th St. Crosstown	414	W. 23rd St. Ferry	3.270	1.513	1.316	3.303	Clinton & Delancey Sts.	448		1.414
4	7th Ave.—Delancey St.	263	Clinton & Delancey Sts.	4.346	1.601	1.282	4.363	59th St. & 7th Ave.	363		1.442
5	Columbus—Lenox Ave.	496	65th St. & Columbus Ave.	4.580	1.468	1.520	4.580	146th St. & Lenox Ave.	443		1.494
6	8th St. Crosstown—Delancey	361	Christopher St. Ferry	2.498	1.176	1.227	2.401	Clinton & Delancey Sts.	315		1.202
7	23rd St. Crosstown	727	W. 23rd St. Ferry	2.083	0.953	0.951	2.083	E. 23rd St. Ferry	718		0.952
8	Lexington Ave.	582	Bowling Green	8.600	1.451	1.292	8.580	131st St. & Lex. Ave.	772		1.372
9	116th St.	247	106th St. & Amst. Ave.	2.275	0.987	1.026	2.275	116th St. & E. River	226		1.006
10	Sixth Ave.	372	South Ferry	5.280	0.875	0.926	5.260	59th St. & 6th Ave.	426		0.900
11	Spring & Delancey St.	192	B'way & Spring St.	1.208	0.779	0.856	1.208	Lewis & Delancey Sts.	150		0.818
12	34th St. Crosstown	475	E. 34th St. Ferry	2.350	1.069	1.029	2.350	W. 42nd St. Ferry	482		1.049
65	Lexington—Lenox Ave.	563	23rd St. & Lex. Ave.	6.620	1.761	1.809	6.620	146th St. & Lenox Ave.	668		1.785
Total	Thirteen lines, N. Y. Rys.	5,633		50.440	1.215	1.183	50.263		6,076		1.199
13	4th & Madison Ave.	687	City Hall	8.305	1.725	1.457	8.325	135th St. & Mad. Ave.	827		1.591
15	86th St. Crosstown	181	86th St. & C. Park W.	1.720	0.668	0.721	1.720	E. 92nd St. Ferry	159		0.695
Total	Two lines, N. Y. & H. RR.	868		10.025	1.197	1.089	10.045		986		1.143
16	Second Ave.	503	B'way & Worth St.	7.725	1.485	1.466	7.725	129th St. & 2nd Ave.	590		1.476
17	First Ave.	474	B'way & Astor Pl.	6.250	1.313	1.508	6.250	125th St. & 1st Ave.	420		1.410
Total	Two lines, 2d Ave. R.R.	977		13.975	1.399	1.487	13.975		1,010		1.443
19	Eighth Ave. R.R. Co., Total	470	Cort. St. & Wash. St.	9.570	1.457	1.393	9.480	159th St.-Polo Grounds	482		1.425
21	Ninth Ave.	341	Canal & Wash. St.	6.370	1.315	1.238	6.370	116th St. & Amst. Ave.	425		1.277
22	53rd St.	329	53rd St. & 7th Ave.	4.160	1.324	1.328	4.160	B'way & 125th St.	323		1.326
Total	Two lines, 9th Ave. R.R.	670		10.530	1.320	1.283	10.530		748		1.302
24	Broadway—145th St.	359	145th St. & Lenox Ave.	2.580	1.301	1.356	2.580	181st & B'way.	478		1.329
25	Broadway—Kingsbridge	535	125th St. & E. River	6.780	1.957	2.053	6.770	225th St. & B'way	623		2.005
26	3rd and Amsterdam Ave.	1,390	Post Office	12.540	1.893	1.847	12.540	193rd St. & Amst. Ave.	1,062		1.870
27	125th St. Crosstown	324	125th St. & E. River	2.075	1.102	1.058	2.075	Ft. Lee Ferry	359		1.080
Total	Four Lines, Third Ave. Ry.	2,608		23.975	1.563	1.578	23.965		2,522		1.571
28	Avenue B.	363	Post Office	4.720	1.170	1.306	4.720	59th St. & 1st Ave.	475		1.238
29	Grand St.—Brooklyn	324	Debrosses St. Ferry	3.169	1.887	1.003	3.175	W'msb'g Bridge Plaza	324		1.445
30	Grand St. Crosstown	292	B'way & Grand St.	1.360	0.684	0.775	1.360	Grand St. & E. River	256		0.729
31	Post Office—Brooklyn	388	Post Office	3.059	1.945	1.911	3.048	W'msb'g Bridge Plaza	296		1.928
Total	Four Lines, Dry Dock, E. B'way. & Batt. R. R.	1,367		12.308	1.422	1.249	12.303		1,351		1.335
32	59th St. Crosstown—Belk Line Ry.	366	54th St. & 10th Ave.	1.795	0.831	0.789	1.795	1st. Ave. & 59th St.	346		0.810
33	Broadway Branch	692	42nd St. & 3rd Ave.	8.260	2.046	1.775	8.260	181st. & B'way.	613		1.911
34	10th Ave. Branch	426	W. 42nd St. Ferry	4.910	1.505	1.395	4.910	12th Ave. & 125th St.	544		1.450
35	42nd St. Crosstown	409	42nd St. & E. River	1.940	1.029	0.959	1.940	W. 42nd St. Ferry	393		0.994
36	110th St. Crosstown	204	3rd Ave. & 110th St.	1.486	0.735	0.824	1.486	125th St. & Hancock Pl.	194		0.780
Total	Four Lines, 42nd St., Manhattanv. & St. Nicholas Ave. Ry.	1,731		16.596	1.329	1.238	16.596		1,744		1.284
Grand Total	33 lines in Manhattan	14,690		149.214	1.308	1.259	148.952		15,265		1.284
98	Brooklyn Bridge Local	240	Park Row	1.174	1.174	1.174	1.174	Term. Bldg.—Sand St.	235		1.174
100	W'msb'g Bridge Local	659	Delancey & Essex St.	1.541	1.536	1.531	1.541	W'msb'g Bridge Plaza	659		1.534

the average length of ride on each line, but also the extent of traffic movement from each of the 135 sections to each of the other sections. From these records data are available for rerouting to accommodate changes in the traffic flow.

Two tables made up as a result of this count are presented, one of companies in the four boroughs and the other of a number of the individual lines in Manhattan Borough. It will be noticed in the former that the shortest rides are in Manhattan Borough and next in the Bronx, then Brooklyn and Queens. It will also be noticed that the average ride in Manhattan is a little more than 1½ miles. This includes the ride on a transfer.

Of course, one reason for the much shorter ride on the surface cars in New York than in other cities is that for long distance travel persons in New York use the rapid transit lines.

The last general survey of this kind made by the New York Transit Commission in New York, though not so extensive as the one just mentioned, was conducted in 1908. At that time the average ride in the different boroughs did not vary greatly from that shown in the recent count.

Theaters and Interurbans Co-operate

AROUND trip fare of one and one-half or one and one-quarter the regular one-way rate is being offered by some of the interurban railways operating out of Indianapolis, Ind., to passengers who desire to come into Indianapolis to attend the theater. The special rate is made good only on the last two trips before theater time and returning that night. A point in making this special rate effective only on the before-theater or before-dinner trains is that local merchants in outlying towns cannot claim that the interurban is offering special inducements to local residents to take their merchandise business into the city.

An innovation in connection with this low-rate theater transportation is that the management of the Shubert-Murat Theater in Indianapolis has added a traveling representative to its staff, whose time is spent in the rural communities to organize theater parties. This theater representative spends six days a week in these small towns and travels entirely on the traction lines. He tries to cover two or three towns a day. After arranging a theater party, he makes all arrangements for a special car, if this is needed.

Co-ordination of Bus and Trolley

Ten Kinds of Desirable Co-ordinated Service Between Trolley and Bus Are Listed and the Possibilities of Each Are Pointed Out—The Bus Is Yet in Its Early Stages and Further Progress Is to Be Expected

By J. A. Emery

Ford, Bacon & Davis, Inc., New York

THE co-ordination of bus and railway services is proclaimed to be the desired answer to the question of the future of city transportation, but aside from some generalities there seems to be no definition of co-ordinated service, and there has been little advance in working out concrete practical plans of co-ordination.

Co-ordination means primarily the avoidance of destructive competition. This is a negative virtue and, of course, a good one, but the main point is that the bus can be made a tremendous help to any electric railway in its business of community transportation and particularly in keeping the conveniences of public modes of travel on a high enough plane to prevent the drift to privately owned vehicles.

The place of the bus as co-ordinated with electric railways is commonly considered to be on routes where the traffic is too light to warrant railway construction. Such locations are generally in the outskirts of cities, and such routes act largely as feeders to the railway.

As a feeder the bus's function is to concentrate traffic to such a degree of density that it can be handled economically by railway lines. In projecting feeder lines, it is not necessary that the feeder be wholly self-supporting, if a profitable fare is obtained on the main line. Railways can in certain cases afford to subsidize bus feeders or to run them at some loss.

While feeder service is a most important use of the bus, there are many other uses fully as important existing in the territory of practically every electric railway. Some of these co-ordinated uses are:

1. Express or local service, jointly with railway lines.
2. Supplementing the service on single-track railway lines, where the railway headway cannot be reduced to meet the demands of traffic.
3. Supplementing the railway carrying capacity in the rush hours.
4. On new routes within the more thickly settled districts, say within 2 miles of the business center, designed to serve districts not contiguous to the railway lines, to supplement the railway through this zone of maximum loading and to reach important delivery points which it is not practicable to reach by direct railway routes.
5. To serve important traffic points like large factories, where waiting cars would obstruct the track and where the greater flexibility of the bus would permit it to make two or more rush-hour trips as compared with one by car.
6. As a substitute for the railway on lines where the track is worn out and the construction of new track is not warranted, or on lines which do not earn operating expenses.
7. For quality service. There is a real demand in all cities for higher priced service than the street cars can afford to give.

8. For pleasure riding. This is one of the most important fields for the bus.

9. For special chartered service.

10. Emergency service.

EXPRESS AND LOCAL SERVICE

On streets where the railway headway is four minutes or less an effective combination of bus and railway service may be obtained by running one facility, preferably the bus, for local service, permitting the railway cars to run without stops.

From the public standpoint this plan has some great advantages. In particular the railway serves to collect passengers in the outer and intermediate residential zones and then to carry them quickly through the more congested inner zones to the business center. At the same time the passengers in the inner zones are inconvenienced because the cars as usually operated are crowded through the inner zones and the local service gives them space of their own. There is a further advantage in that in the inner zones, where the vehicle traffic is heavy, it is much safer and pleasanter for passengers to get on or off at the curb, as may be done with the bus.

While individual lines operating on four-minute headway are not common outside of large cities, there are many cases where two or more lines converge on one street at a distance of 2 or 3 miles from the business center, giving a total service of fifteen or more cars per hour. With joint railway and bus operation, bus local service would have to be at least as frequent as ten cars per hour, and the railway service could hardly be reduced below twelve, making a total of twenty-two units per hour to be operated as compared with fifteen. However, the railway speed would be increased by fully 20 per cent, reducing the number of cars in operation on the section by 20 per cent, and the cost of operation of a one-man bus is substantially less than that of a two-man car such as is used on most heavy traffic streets.

If the principle be accepted that better service attracts more business, then this plan of operation should get a further credit, for it will bring the outlying districts from three to ten minutes closer to the business center, dependent on the length of the express run, and affords a more attractive local service in the congested zones.

An enlargement of this plan of operation on long lines with heavy travel would be to run express service on the railway for the entire distance, with stops not less than three-quarters of a mile apart and with buses doing the local work and transferring to and from the cars at the express stops. This arrangement is similar to that in the four-track section of the New York subway.

On single-track lines, where the traffic at some

periods requires more service than can be operated properly on single track, buses can be used to good advantage to supplement the railway service, thus obviating the necessity for second tracking or for relocating turnouts. In this case the buses should be spaced between the cars on that part of the line where the load is gathered, and care must be taken to prevent bunching of service at such points, due to the cars waiting on turnouts.

An important feature of this plan is that the route of the buses in the business district can be extended beyond the railway route if desired to reach important traffic points not reached by the railway route.

SUPPLEMENTING RAILWAY SERVICE IN RUSH HOURS

The bus can be made a valuable adjunct of the railway in handling rush-hour traffic. In cities of more than 200,000 population and in some smaller cities there are main arteries on which the track capacity is fully taxed and, therefore, increases in service cannot be made when needed. The bus as an adjunct can be used on such streets where tracks exist, but a great field of usefulness is on parallel streets not occupied by tracks. When it is proposed to run buses on such streets the selfish plea is sometimes set up that these streets must be reserved for private automobiles. As observed in several representative localities, private cars carry on an average less than two persons per car. It is, therefore, preposterous to devote a valuable thoroughfare to such wasteful use when the great body of the public is confined to the remaining overburdened streets. The streets should be used for the greater general good.

Taking into account the necessary carhouse and shop facilities, substations and feeders, but not the track, the investment in a double-truck car seating fifty-five passengers is about \$25,000, or about \$450 per seat. A good single-deck bus seating twenty-eight involves an investment of about \$10,000, or \$350 per seat. With a standing load equal to the seated load the electric car costs as much per passenger as the bus with half as many standing as seated. With a double-deck bus seating about sixty-five the investment is only \$200 per seated passenger.

When the extra cars are on the street in the rush hours it is hard to maintain schedules on many crowded sections of track. It is a practicable matter in many such cases to take the point off the peak with buses. Due to the flexibility of buses they can be routed to avoid the most congested corners and to use streets which cannot be used by the railway.

AUXILIARY ROUTES IN THICKLY SETTLED ZONES

One of the most trying and baffling of sights to the electric railway man is to stand near the boundary of his central business district and see the swarms of pedestrians, particularly at the rush hours. There is no quarrel with those who walk for their health, but a large percentage of these people would ride if the transportation company had the goods to offer. What are the goods?

1. A rate of fare in some measure proportioned to the length of the ride.
2. Car capacity. During the rush hours it is generally hard to get on cars leaving the business district and very uncomfortable when once on.
3. In the thickly settled zones, as the railway lines cannot run on every street, there are many people for

whom the combined ride and walk is less convenient than a direct though longer walk between business district and home.

How two of these problems can be helped by co-ordinated bus service is shown by the following diagram:

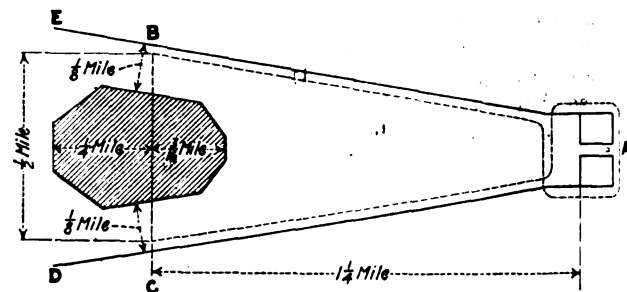


Diagram Showing Possibilities of Auxiliary Route in Thickly Settled Zones

AE and AD represent radiating railway lines. ABC is a bus route operated in both directions. The population in the shaded area live within walking distance of the edge of the business center and to use the street cars they must walk from $\frac{1}{8}$ to $\frac{1}{4}$ mile. The result is that a large number walk, making the average rides per capita low.

The proposed bus route if operated both ways on ten-minute headway would require the regular patronage of about 3,000 population with transportation expenditures of \$18 a year to support it. The shaded area, which may be considered as served most conveniently by the bus line, contains 40 acres, and to accommodate 3,000 population would require a density of 43 per acre, which is not an unusual figure for districts within $1\frac{1}{4}$ miles of a business center or more than 100,000 population.

A bus route of this character would further provide added capacity past the maximum load points on the two main railway lines. There are many cases where outlying local business centers occur at points like B and C. In such cases the bus route would accommodate cross traffic, which is seldom sufficient in volume to warrant a railway line.

AUXILIARY SERVICE TO IMPORTANT TRAFFIC POINTS

At large factories, ball grounds and other important traffic points extra cars are often provided. Unless the traffic is large enough to warrant spur tracks, these extra cars must wait on the main line and generally interfere with schedules. Buses are ideally adapted to such extra service. They can wait without impeding other traffic; they can be routed when desired to avoid the congested business center, and in many cases by reason of routing flexibility they can make two trips where street cars could only make one. Further, they can be made to accommodate different points on different days as needed.

SUBSTITUTION FOR RAILWAY LINES WHICH DO NOT EARN OPERATING EXPENSES

If the average operating expenses on a given railway be, say, 40 cents per car-mile (including replacements), there will be found many lines or routes earning substantially less. The traffic on such light traffic routes could be handled readily by one-man buses, the total cost of service being not more than 30 cents per bus-mile, with labor at 60 cents per hour. It would often

pay to substitute buses for cars on such lines if the paving be suitable and particularly if the railway track be below the average. One-man cars can be operated at about the same cost as buses if the track is in good condition, but if the investment in track be taken into consideration, bus operation is generally cheaper. In case of substitution, the net salvage on the track is small so that the railway would still have to carry fixed charges on a large part of it. If the track is in good shape, so that the maintenance cost is not above the average and so that single-truck one-man cars can be operated satisfactorily, then there is no advantage in the use of buses. If, however, new one-man cars have to be purchased, it would generally be preferable to substitute buses.

Each case of this kind should be carefully figured out. It is safe to say that there is not an electric railway of importance in the United States which does not have one or more lines on which it would pay to substitute buses for cars.

QUALITY SERVICE

It is a great mistake for the public as well as for the railway to attempt co-ordinated bus service at the same rates of fare as the railway in every case for this seriously curtails the usefulness of the bus in the public service.

In one particular a higher rate of fare will enable bus lines to be established in more thinly settled territory.

Of fully as much importance, however, is the fact that a higher rate of fare will enable the buses to give a better quality of service for which there is a real demand. This may take the form of a seat for every passenger, or of shorter headways, or of more convenient deliveries in the business district. The consideration of rate of fare is secondary to that of service and there is plenty of evidence that a considerable proportion of the people are willing and glad to pay more than the regular railway fare to secure better accommodations. It is hardly possible to differentiate the service as between lines or cars on a street railway, but with co-ordinated bus service a great field in this particular is opened.

PLEASURE RIDING

Analyses of traffic of bus lines operating double-deck buses indicate that as much as 25 per cent of the travel is for pleasure. Less than one-half of the families in the United States own automobiles, and in the larger cities the proportion is much smaller, running down to one in four or five. The majority of city dwellers therefore have no way of participating in the enjoyment of parks and drives. Every city has drives which it is practicable to make available to the public by the use of motor buses. Such lines can be operated as regular all-day routes if there be regular traffic demand, but it is also feasible to operate them only on nights, afternoons, Sundays and holidays in summer. There is a ready use for the buses in winter to supplement the railway service in the rush hours.

SPECIAL CHARTERED AND EMERGENCY SERVICES

In years past electric railways did an important business in chartering cars. With the much greater traveling range of the motor bus, there should be a great field for this class of service. In securing rights to operate buses, the freedom to cultivate this business

should be provided for. School and hotel service comes under this head.

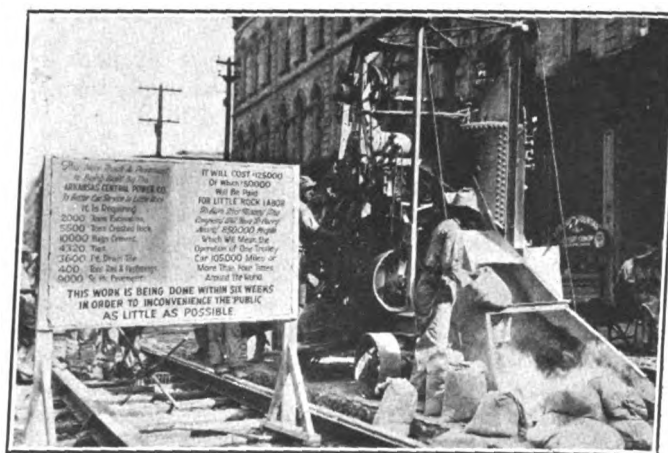
The bus will become invaluable to help out electric railways in handling large crowds to and from special points, in carrying special crowds from railway stations to sports or conventions, and in operating special relief routes when the regular routes are interfered with by parades or otherwise. A further use of this nature is to have one or more buses at a central dispatching point to inject into the schedule when a car becomes overdue on account of accident or other case, or when unexpected loads present themselves.

NECESSITY FOR RAILWAYS TO KEEP ABREAST OF BUS DEVELOPMENTS

Electric railway managements owe it to their stockholders and themselves to keep abreast of bus developments with first-hand knowledge and experimentation rather than hearsay opinion. The bus is in an early stage of development. While its field may be somewhat limited at present, a small gain in efficiency will put it on a par with electric railways under any conditions and it behooves the street railway industry to keep its eyes open.

Good-Will Publicity During Construction Work

CONSPICUOUS signs have been placed in the streets of Little Rock by the Arkansas Central Power Company in an endeavor to win the good will of the public at a time when a certain amount of inconvenience is experienced due to torn-up streets. In this way the



Sign Displayed in Little Rock, Ark., to Win Public Good Will During Track Construction Work

company is taking advantage of the opportunity of telling the public what is being done when street construction work is under way.

One of these signs which was used in connection with trackwork on Markham Street and which is shown in the illustration reads in large letters:

"This work is being done within six weeks in order to inconvenience the public as little as possible."

Emphasis was also placed on the fact that \$50,000 was being spent and would go to Little Rock labor. The quantities of various materials required were listed so as to interest the public by pointing out the extent of the undertaking.

A similar sign was displayed during construction on East Fourteenth Street, calling attention to the year's work in this manner:

"When this job is finished, it will complete the work this company has been doing in the last year to improve the street car tracks and pavements and which has cost \$275,000. This includes the relaying of 4 miles of tracks and repaving of one-third of all the pavement between our tracks in Little Rock."

The Markham Street job, which was started Aug. 14 and completed the night of Sept. 22, consisted of the removal of one mile of double track and two blocks of single track, removal of pavement and concrete foundation under the track, excavation, reballasting and relaying of track, putting in of concrete foundation and Warrenite paving between the track and 2 ft. on each side. Traffic was continued during construction by using one track at a time. The city made the street a one-way street and the company co-operated so that no cross streets were blocked for more than two hours at a time. The cost of the extra traffic policemen required was paid by the company.

The East Fourteenth Street job consisted of the removal of 3,500 ft. of track, together with the work of excavation, reballasting and paving with concrete between tracks and for 2 ft. on each side. This section was practically at the end of the line, and traffic over the portion of the line being rebuilt was suspended for the two weeks required to complete the work.

During the time that rail service was interrupted, buses were operated by the company on a parallel street one block away. These buses were operated on the same schedule as that which had been maintained by the cars and free transfer privileges were extended to passengers in both directions.

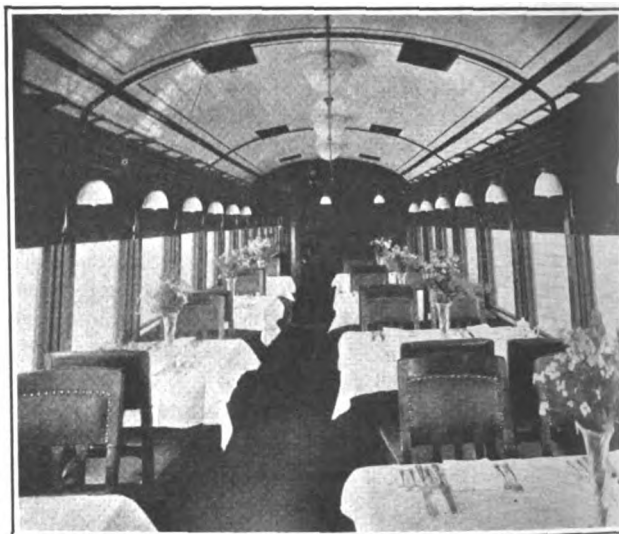
Latest Type North Shore Diner

New Cars Are Designed for This Purpose Exclusively and Arrangements Follow Closely Those of Steam Road Diners—Service Has Proved Popular

THE Chicago, North Shore & Milwaukee Railroad began its dining car service with a design of car that could be used both as a diner and as a club car. People who bought their meal en route were permitted to remain in the car for the entire journey, and the car was also used purely as a club car on some runs between the meal hours. But the patronage of the diner service has grown to such an extent that several sittings are served and people come in from and go back to their seats in other cars as on steam roads. Hence it was necessary to provide some diners of larger capacity than the combination club-diner cars. The newest type diners are planned exclusively for dining service and are operated only on the meal-hour runs.

The new diners are four-motored cars of characteristic North Shore design and weighing 102,000 lb. The exterior resembles very closely the North Shore passenger cars with the exception of the ventilators and flues on the top over the kitchen compartment. The North Shore green color is used on the outside, with the

ends of the car painted orange, as is done on all cars used in "limited" service. The interior finish is in natural mahogany, with which the chairs and tables harmonize. The ceiling is of steel finished in a light cream color. A heavy nap green plush carpet adds to the appearance of the interior. In place of the heavy leather-stuffed armchairs previously used in the club-



Pleasing Appearance Marks Interior of New Dining Cars of North Shore Line

diners, neat, straight chairs without arms and with leather upholstered seats and backs have been provided.

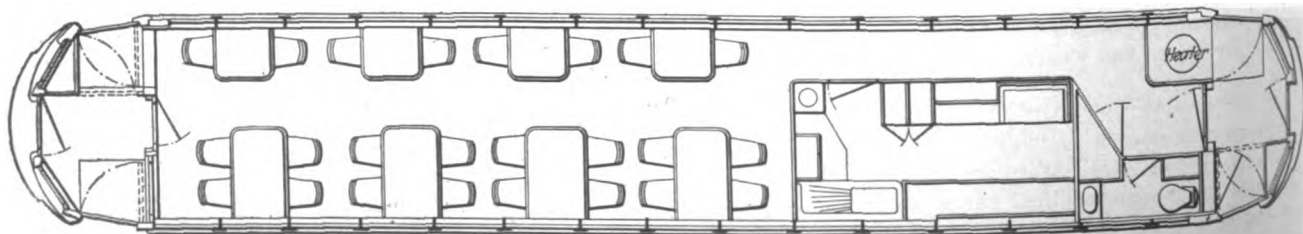
The heating facilities of the car are identical with those in the observation cars described on page 56 of the ELECTRIC RAILWAY JOURNAL for July 14, 1923.

The kitchen represents the utmost in convenience and compactness and contains every cooking utensil and facility necessary in the preparation of palatable food. Service from the kitchen to the waiters is made through a window in the panel of the kitchen on the aisle side. This, to a large extent, eliminates the confusion encountered in dining kitchens where the waiters must enter the kitchen to secure the orders.

There are now fourteen trains operating between Milwaukee and Chicago giving de luxe service which carry special equipment either in the form of diners or observation cars. Six of these trains are in addition to the regular hourly service between the two cities.

Dimensions and other data are given below:

GENERAL DIMENSIONS			
Length over all.....	55 ft. 3½ in.	Bulkhead door opening.....	26 in.
Length over train door posts.....	53 ft. 6½ in.	Seating capacity.....	24
Length over body.....	44 ft. 2½ in.	Truck centers.....	32 ft. 8 in.
Length of platform.....	5 ft. 6½ in.	Wheelbase.....	7 ft. 0 in.
Extreme width.....	9 ft. 0 in.	Wheel diameters.....	36 in.
Rail to top of trolley boards.....	12 ft. 7½ in.	Post centers.....	35 in.
Rail to bottom of side sills.....	3 ft. 4½ in.	Type of roof.....	Arched
Rail to first step.....	16½ in.	Interior finish.....	Natural Mahogany
Width over side sheathing.....	8 ft. 8 in.	Type of heater.....	Hot water and electric
Vestibule door opening.....	29 in.	Type of ventilators.....	Garland C-1
Train door opening.....	26½ in.	Sash.....	Brass



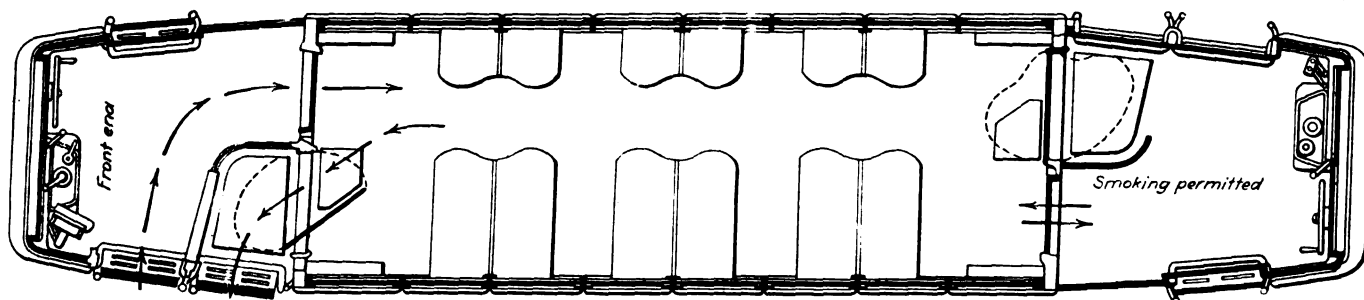
Floor Plan of Latest North Shore Diner Showing Compact Kitchen Layout and General Arrangement

One-Man Cars in Sweden

Separate Entrance and Exit Doors Are Provided—Cars Are Double-Ended, with Bulkheads, and Rear Platform Is Used for a Smoking Compartment

ONE-MAN cars have been introduced into the service of Malmö, Sweden. A description of the type used is given in *Verkehrstechnik* for July 1, 1923. In order to reduce the labor of the motorman, several interesting features have been incorporated. The cars are of a double-end type and incoming and outgoing passengers are kept separate by having distinct entrance and exit doors and a pipe barrier on the platform. The entrance to the platform is always open, but hinged end doors are provided between the platform and the body of the car. The operation of these doors is controlled by the motorman. The exit door when unlocked is opened by the passenger pushing on it, and it closes automatically after the last passenger leaves the step of the car. The various movements and interlocking are controlled by the motorman from the operating end. By turning a lever 30 deg. toward the front, a stop signal light is displayed, the exit door is unlocked and the fare box is swung into a convenient position for receiving fares. At night a number of lamps for illuminating the platform are also switched on.

When passenger interchange has finished, a return of the lever again locks the exit door, swings the fare box back and extinguishes the lights on the platform.



Type of One-Man Car Used in Malmö, Sweden

This entire operation is accomplished mechanically without the use of compressed air or electricity.

This arrangement of doors between the platform and car body provides a convenient compartment for smokers in the rear. On most of the lines where this car is operated, passengers board and alight at each stop and the double door arrangement has been very successful. The fare boxes automatically sort copper and silver coins and may be carried from end to end or taken off the car. On lines where boarding and alighting are rarely done simultaneously standard cars are being used, and the exit as well as the entrance is through the same door.

One-man cars are also operated in Augsburg. They were introduced in order to meet the increased operating costs. The city is a trade and manufacturing center with a population of 160,000. The car lines are single track, with a total length of 18 miles. Sidings are provided about every 0.4 mile. Standard cars were first operated by one man in 1922, but as the rush hour traffic is quite heavy, two men are used between the hours of 6 to 8, 11 to 2 and 4 to 8. When operated by one man the rear door is kept closed and

entrance and exit are through the front door opening. The introduction of one-man operation has reduced the schedule speed, but by increasing the number of cars the public is better served and the operation is much more economical.

One-man cars operated in the city of Brandenburg are equipped with automatic ticket selling machines. Upon entering the passenger drops a token into the box and receives his ticket. The tokens are of a circular design and have a groove on each side to fit into a special slot in the machine.

Tokens are made in two different colors, yellow and white. Yellow tokens can be purchased from the motorman upon entering, and the white kind can be obtained in advance at a 20 per cent reduction in cost. The tickets permit a single transfer and must be punched in order to be valid.

Chicago Elevated Operates the Greatest Number of Trains on Single Track

ACCORDING to the latest available figures, the maximum number of trains operated in a single direction on a single track is on the Chicago Elevated between Grand Avenue and Chicago Avenue northbound during the evening rush hours. Between 5:15 and 6:15 there are seventy-one trains, of which sixty-six are operated by the Elevated and five by the Chicago, North Shore & Milwaukee Railroad.

The second greatest number of trains scheduled

or operated is at Charing Cross Station of the Metropolitan District Railway, London. At this point there are forty-one trains westbound during the maximum hour. Next in point of density is the operation of the Hudson & Manhattan Railroad from the Hudson Terminal, New York City, where there are forty trains per hour over a single track. At several points the Euston & Hampstead section of the London Electric Railway operates thirty-five trains an hour in one direction. At Times Square, New York City, the Interborough Rapid Transit Company has thirty-three scheduled trains in an hour, although this schedule is rarely attained.

When the number of cars per hour is considered, the Chicago Elevated leads again, but by a smaller margin. There the greatest number of cars passing a single point during the maximum hour is 387. At Times Square, the maximum schedule of the Interborough calls for 330 cars per hour. The Metropolitan District Railway operates eight-car trains, giving 328 cars per hour west bound at Charing Cross. At Hudson Terminal the number of cars per train is also eight, making a total of 320 cars per hour at that point.

Sleeper Service on Interstate

Cars to Be Operated as Trailers Between Indianapolis and Louisville—Berths Will Be 3 In. Longer than in Pullmans, and Uppers Will Have Windows

NEW sleepers for the Interstate Public Service Company, Indianapolis, are now under construction by the American Car & Foundry Company at Jeffersonville, Ind. The new cars will be operated as trailers on night runs between Indianapolis and Louisville, and their operation will mark another step in the program instituted by the Interstate for providing the last word in electric railway service between the two cities. It is the intention, since these cars will be operated at night, to haul them with the new express motor cars which are also under construction. The sleeper trains will leave the two terminals along toward midnight and then will be left just outside the terminal city until picked up later by another train to arrive about 7 a.m.

The general construction of these sleepers will be practically identical with that of the new club cars which were recently put into service and described in this paper, issue of Dec. 22, 1923. The intention is to adhere very closely to the same underframe design for all new passenger equipment built in the future.

PROVISION FOR PASSENGER COMFORT

Liberal provision will be made for the comfort and accommodation of passengers. The berths will be built on 6 ft. 5 in. centers, making them approximately 3 in. longer than a standard Pullman berth. Another innovation will be that the upper berth will have a window so that the upper berth passenger can regulate his ventilation as well as the lower berth passenger. The berths can be made up into seats as on a Pullman for daylight travel.

Because of the limited width of the car, the men's smoking room, as now laid out, will extend across one end of the car, and it is the intention to load and unload passengers at the opposite end only. A train door has been provided at the men's end, however, so as to allow trainmen to pass through if necessary. Unusual facilities for comfort and privacy are included in the arrangement of the ladies' washroom.

In addition to overhead lights and berth lights, floor lamps will be provided along the aisle at alternate berths so as to illuminate the floor when the rest of the car is in darkness at night. There will be deck ven-

tilators spaced at frequent intervals and, in addition, electric fans mounted on the bulkheads at each end of the main compartment and also in the men's smoking room.

Daily Quotation on Street Car Fares

STREET car fares have changed so rapidly in Germany, because of the varying value of the mark, that some railways have been obliged daily to post up the fare in force on that day. Such a poster, issued by the Berlin street railway system, is reproduced below. As

Berliner Straßenbahn-Betriebs-G. m. b. H.

Umrechnungskurs
für Schatzanweisungen des Deutschen Reichs
(Goldanleihe und Notgeld der Stadt Berlin u. der Industrie usw.)

Papiermark in Milliarden

1 Dollar = 4,20 Mark Gold =	
1/2 " = 2,10 " " =	
1/4 " = 1,05 " " =	
1/10 " = 0,42 " " =	

Fahrpreise:

	In Goldpfennig	Papiermark in Milliarden
Einzelfahrschein		
Kinderfahrschein		
Hochbahn-Übergangsfahrschein		

Daily Quotation on Fare Charged, as Issued by Berlin Street Railway

has been explained in recent issues, the Berlin system is operated by a corporation, although actually owned by the municipality.

A translation of this poster is as follows:

BERLIN STREET RAILWAY OPERATION, INC.

Exchange Schedule of.....1923

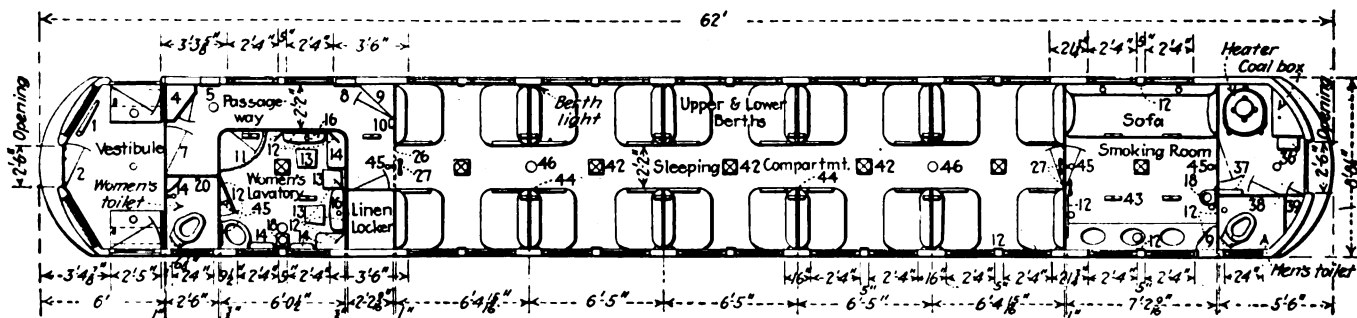
For the currency of Germany

(Gold certificates and currency issues of the City of Berlin and industries, etc.)

Paper Marks in Billions

1 dollar = 4.20 gold marks =	
1/2 dollar = 2.10 gold marks =	
1/4 dollar = 1.05 gold marks =	
1/10 dollar = 0.42 gold marks =	

Fare	In Gold Pfennigs	Paper Marks in Billions
Single fare for adults		
Single fare for a child		
Transfer ticket to the elevated railway		



Probable Floor Plan of New Interstate Sleepers

- | | | | |
|--------------------------------------|--------------------------------|-------------------------------------|--------------------------|
| 1. Handbrake. | 9. Water cooler; locker below. | 18. Dental bowl. | 38. Overhead water tank. |
| 2. Train door with drop sash. | 10. Cup container. | 20. Overhead tank. | 39. Locker. |
| 3. Switch locker. | 11. Portiere. | 26. Illuminated "Women" on transom. | 42. Center lamps. |
| 5. Wrecking tools. | 12. Mirrors. | 27. Fans. | 43. Exhaust ventilator. |
| 7. Hinged screen outside; drop sash. | 13. Chairs. | 36. Folding seat. | 44. Floor lights. |
| 8. Time table holder. | 14. Shelf. | 37. Annunciator. | 45. Bracket lamp. |
| | 16. Dressing tables. | | 46. Pendant. |

Association News & Discussions

Railroad Transportation Features A. I. E. E. Meeting

**Operating Problems of the Steam Railroad and Possibilities of Electrification Main Topics of Afternoon Meeting—At Evening Session
Prominent Speakers Treat of the Broad Conception
of the Transportation Business**

TWO sessions, afternoon and evening, were given to the subject of railroad transportation at the midwinter convention of the American Institute of Electrical Engineers, held in Philadelphia on Feb. 5.

The afternoon session, at which N. W. Storer, general engineer Westinghouse Electric & Manufacturing Company, presided, was on the subject of railroad operating problems and possibilities of electrification as a means of solving them.

L. G. Coleman, assistant general manager Boston & Maine Railroad, summed up the problem of the operators as one of lost motion. The old style locomotives not only employed simple steam engines, but only a few auxiliaries were included. There were no complications, and they could be kept on the road 75 per cent of the time. Modern steam locomotives, on the other hand, have more parts and greater complication. It has not been found possible to have them available for service more than about 45 per cent of the time. On his road it used to be possible to turn an engine at the end of its run in two hours, but this cannot be done with locomotives of the

about equally fast. This emphasizes the need of getting more intensive use of the plant in order to keep down transportation costs. One suggestion made by the speaker is to use containers of some sort, so that the body or "chassis" of the car can be kept moving while the container is being loaded or unloaded.

The field for improvement is open, concluded Mr. Coleman. Electrification may be the solution, although railroad men have not yet been convinced that its use will pay.

N. & W. ELECTRIFICATION HAS INCREASED CAPACITY

Experience on the electric division of the Norfolk & Western was given by J. E. Crawford, assistant general manager. The territory electrified is a very heavy originating section for freight, consisting principally of coal. That section of the railroad has many grades, and determines largely the carrying power of the entire system.

The constant-speed locomotive has given very good results in the nine years of service, said Mr. Crawford. The actual cost of operation with electricity is about 8 per cent less than

the electric service at the present time, he said, comes from postponing heavy expenditures on capital account that would have to be made were the capacity of the system to be increased while using steam power.

The cost of repairing and maintaining locomotives of the two systems is difficult to compare, partly on account of the difference in capacity, and partly because the electric locomotives were at first too light and had to be rebuilt. The original weight was 63,000 lb. per driving axle. Changes which have been incorporated have increased the weight to 68,000 lb. per driving axle and have made the locomotives capable of much greater mileage and quicker turning.

The constant torque feature of the electrics has proved of great value in acceleration. A train weighing 3,300 tons can be started from rest on a 2 per cent grade and brought up to 14 m.p.h. in about two minutes. It takes some ten minutes with steam engines to get the same train up to a speed of 8 m.p.h.

ELECTRIC LOCOMOTIVES HAVE GREATER AVAILABILITY

An electric locomotive should be able to make about twice the mileage possible with a steam locomotive, said Mr. Crawford. After finishing a run the electric locomotive can be turned in forty minutes and started out on another trip. This can be kept up day in and day out for a period of some two weeks, at the end of which time it is necessary to give it a thorough inspection. Experience on the Norfolk

The cost, pound for pound, was just twice as much as that for a steam locomotive. The company has just purchased four more, with a tractive effort of 140,000 lb. at a price equal to twice the price per pound of a steam locomotive. So the difference in cost persists. There is no saving from the use of electrics in capital investment, but there are great savings due to the quicker turning and the higher speed. This results in a greater capacity of the road than was possible otherwise.

The cost of repairs in the last year was 37 per cent greater for the steam locomotives. Prior to that it was higher for the electrics, but this was largely on account of the rebuilding to strengthen them, referred to previously.

The installation is a special one for very heavy service on heavy grades. The power demand factor is poor on account of the limited extent of the electrified division. The fuel saving shown has been 12 per cent. Under favorable conditions Mr. Crawford believes it should run as high as 25 to 30 per cent. The regenerative braking is a factor in this, as one electric loco-

road is built to handle a certain peak load, he said. It is not what the system can do the year around that counts, but what the service will be during the peak. An increase of 50 per cent in speed is a big factor in moving tonnage during the peak, and cuts the investment that must lie idle the rest of the year. The steam locomotive is actually in use but two hours fifty minutes out of the twenty-four, averaged over the year. There are, however, possibilities of increasing this use. One railroad is making engine runs of 600 miles, and another, runs of 800 miles. These records are, however, made with oil-burning engines.

In reply to a question, Mr. Coleman stated that the limits to the railroad's capacity are the strength of bridges, the length of sidings and passing tracks, and the weight of rail. There is no practical limit to speeds of freight cars. Most of them can go 40 to 50 m.p.h. if necessary. Modern steam freight locomotives, however, cannot safely run more than 40 m.p.h. without excessive maintenance.

With the electric system, in addition to the cost of the locomotives there is

The limitations on the capacity of steam roads, referred to by Mr. Coleman, are not likely to be raised for many years, in the opinion of William Elmer, superintendent of the Harrisburg-Altoona division, Pennsylvania Railroad. Drawbars have been standardized by the Master Car Builders' Association for a maximum of 400,000 lb. pull without failure, and the underframes and draft gears are designed for the same limit. Bridges are designed for Cooper's E-60 loading, or 60,000 lb. per axle. The high train weights reached on some roads are attained only by the use of special cars, that are not generally available. With ordinary cars the length of train to get these high capacities becomes so great that the crew cannot handle it efficiently. Some 100 cars, giving a train length of 4,500 ft., seems to be about the economical limit.

Some figures on locomotive performance were given by Mr. Elmer. When 50 per cent of the steam locomotives on his division make 3,000 miles per month or better it is considered good performance. Of the passenger engines some show as high as 10,000 miles per month, and the average is more than 5,000 miles per month. A good locomotive, he said, should do 160 miles per day.

Mr. Coleman stated that, based on Mr. Elmer's figures, the availability of the steam locomotive is less than 25 per cent. Under federal control the number of hours available for service of all steam locomotives was 36.75 per cent. He thinks that any standard mainline steam railroad will have an availability factor for its motive power of well under 45 per cent, the figure quoted by one of the speakers.

TRANSPORTATION AN ESSENTIAL INDUSTRY

Railroad transportation in its broad conception, both past and present, was the topic of the evening session at the Metropolitan Opera House. The next

Alongside it was the new L-5 locomotive described in the *ELECTRIC RAILWAY JOURNAL* for Jan. 26, page 133. This is a locomotive for preference freight, and, with a change in gearing and control, it also is suitable for passenger service. Both of these locomotives are illustrated herewith. Between them was the latest type of Brill gasoline rail car. A two-car train of the standard multiple-unit cars used in the local suburban service out of Philadelphia also was exhibited.

Western Society Takes Up Traffic and Transportation Problem

THE Western Society of Engineers met in Chicago this week Wednesday and Thursday in its third annual convocation, the subject this year being "Transportation and Chicago Development." Various aspects of the general problem of providing better transportation and relieving street congestion were treated in a number of papers, some of which are published here, with a report of the proceedings and others papers to follow in a later issue.

Through Streets to Relieve Traffic Congestion*

By E. S. TAYLOR

Office Manager Chicago Plan Commission

TO RELIEVE street congestion and reduce accidents, the Chicago Plan Commission believes that Chicago needs a scientific, well-designed and inclusive system of "through streets" to take the place of the present expedient. Such through streets as have been established bear no relationship one to another. They do not extend continuously through the city, and they were set aside before a study of the traffic needs of the city as a whole had been made.

Many street accidents are caused because the traffic is a mixture of slow-moving, horse-drawn vehicles, rapid-moving automobiles, street cars, trucks, wagons and the like, all jumbled together indiscriminately. Records compiled by the safety commission of the Chicago City Council show that fewer accidents occur on boulevards than on ordinary streets. Boulevard traffic moves much faster than the traffic on other streets because it is limited to a single class of vehicles and has the right of way over cross traffic, which must come to a full stop before crossing the boulevard.

According to the technical experts of the Chicago Plan Commission, the solution of the accident problem lies in segregating traffic into similar classes; in providing separate routes for the different classes; and particularly in keeping through automobile traffic off car line streets. Since every important street in Chicago has a car line upon it, it has been a real task to find other streets which can be set aside as "through streets." These streets would take care of rapid-moving traffic, leaving the car line thoroughfares free for

street cars, slow-moving commercial vehicles, and local traffic.

Little or no opposition to the establishment of these "through streets" is anticipated. The street car company and the merchants of the city will favor it, it is believed, because it will speed up street car service, will increase the efficiency of commercial vehicles, and will save time and money for every one. At present our business streets are filled with vehicles which do not properly belong there, but which must use these thoroughfares because there are no others for them to use. When these through-bound vehicles have been given better facilities on other thoroughfares, the congestion on the business streets will be lessened, street cars can move faster, and local traffic will be better

able to stop and do business along the street.

Automobile users will also favor through streets as it will enable them to make better speed, not being hampered by slower classes of vehicles.

By providing a dozen or more "through streets" on each side of the city instead of only one or two as at present, traffic will no longer be as highly concentrated on a few streets as it is now, but will be diffused generally throughout the entire city, thus relieving congestion on our main thoroughfares and boulevards and providing room for future expansion. Such "through streets," of course, must be adequately marked and lighted, and steps toward this end have already been taken by the city's department of gas and electricity.

Second-Story Sidewalks*

Would Relieve Traffic Congestion While Waiting for Subway Construction by Removing Bulk of Pedestrians from Surface Grade So That Vehicles Could Make Faster Speed Safely

By J. H. SAWYER

Bridge Design Engineer, City of Chicago

THE average number of stories for buildings in the present iron Loop in Chicago is approximately eight. A Chicago daily paper stated a year ago that the traffic during the Christmas shopping season was 100 per cent of the street capacity and that in two or three years the streets would be as crowded every day as during the 1922 Christmas shopping period. Of course, the paper went on to advocate subways. But subways are delayed for a number of reasons:

First—More than half the frontage on most of the streets must be placed on caissons before digging could be begun and this, of course, is not a small expense. And may I ask why should owners of old buildings build new high buildings on caissons with street traffic so near the maximum? For only a few more new high buildings could be rented.

Second—The objection to Loop subways from outside business centers is growing—not diminishing.

Third—A subway plan that would please all interested parties seems difficult to obtain.

Subway construction must provide utility galleries for all utilities, both for present and future growth. All utilities for a street must be moved temporarily to adjacent streets and alleys before construction begins. In the aggregate, this expense will be considerable.

A subway does not and cannot provide for pedestrian traffic in the Loop. It will only bring in more people but it does not provide for their getting about in the Loop.

To discuss the growing difficulty in street crossing in the Loop, to life, limb and patience, is hardly necessary, for everyone who has to walk about in the Loop has hair-breadth escapes. You come to the street crossing, wait until the policeman blows the whistle, and as you start to cross the street you are

stopped by cars and vehicles coming around the corner. Before these cars stop, the policeman has again blown his whistle, and in sheer desperation, you start on the run to dodge between the moving cars. When at last you are fortunate enough to reach the other side, out of breath, perhaps, you may have at least to face the sarcasm of some motorists. Or, if you are motor-ing through the Loop, you wonder why "the persons on foot are always in the way; surely they should be killed."

One thing is certain, the pedestrian's and motorist's point of view are very different, and as long as they are in each other's way, why not separate them, if possible. A second-story level street for the Loop district has been suggested by one engineer; and this may be by far the more economical way of building the subway.

But, let me ask again, why build subways if an average of eight stories has filled the street to capacity? Subways would bring more people to a place already too full and too dangerous to get about and do business in.

But until subways are built, to assist in handling pedestrian traffic while they are being built and to handle pedestrian traffic after they are built, I am suggesting another feature, showing you its faults and how to meet them and what I believe to be some of its many good points.

Suppose the street cars are placed in subways, the motor cars on the street (we are not going to banish them) are still a menace to the pedestrians crossing streets and the pedestrians are more in the way than ever.

With the street cars gone from the streets, the motor cars could go as fast as they now do on Michigan Avenue, except for the pedestrian who will still refuse to go down in tunnels to cross streets, as is now the case at Randolph Street, where an understreet passage is available to aid in reaching the Illinois Central suburban station.

It might be well to say here that the

*Abstract of paper presented before Annual Convocation Western Society of Engineers, Chicago, Feb. 6 and 7.

*Paper presented before Annual Convocation Western Society of Engineers, Chicago, Feb. 6 and 7.

Western Society of Engineers has been fathering the investigation of this idea—let me insist, the *investigation* of the idea. In October, 1921, it was arranged that I present a paper on this idea, which I did in February of last year.

Since that time some of the newspapers have been interested, as you know, and not later than Jan. 16 and 17 of this year, Col. Harvey W. Corbett, a New York architect connected with the Sage Foundation, read a paper before the American Society of Civil Engineers advocating second-story walks for pedestrians and a separation of the three kinds of traffic—foot traffic, wheel traffic and rail traffic.

Suppose we had a sidewalk on both sides of every street, streets with street crossings at the street intersections, but all at the second-story level, with second-story shops and shop entrances as on the present ground level. And suppose this sidewalk extended over the entire loop and connected to the elevated stations at their street-crossing level, directly under their tracks. Could not this increase, if not double, the pedestrian capacity of the Loop?

The second-story sidewalk could be as wide as, or wider than, the present ground-level sidewalk, and not interfere with it—simply be an awning for it.

From steel buildings the walks could be cantilevered out from the steel work. In front of old buildings slender steel columns could be placed 20 ft. or more apart, out near the curb, but always well protected. If necessary, there can be another column at the building. The construction should be of light, shallow steel girders and small beams, wire mesh reinforced concrete slabs with plenty of prismatic glass. Drainage would be to a post or down the face of the building in adequate downspouts.

But why discuss details? You can see how easy it is. Of course, details must always be modified as much as possible to accord with the adjacent building. The height above ground must be that of the average second-story height for that block and side of the street.

But at the street crossings, the bridges should be built just high enough so that the trolley wires can pass under them. At the ends of these bridges, there would be a step or two up or down, as may be necessary to connect with the second-story sidewalk for that block.

Details of stairs and escalators down to present street level sidewalks would be worked out, as well as openings for stairs and elevators in buildings for the convenience of pedestrian traffic; also details of building store fronts, etc.

There will also be easy connections to elevated railway stations; there will be bridges across streets between street intersections midway in the block; from these bridges, in wide streets, possible stairs lead down to landing platforms for loading and unloading trains of street cars. This idea has been suggested for subways. All these and many other details will suggest themselves to you.

But someone says with some justice, what is it going to look like? Yes, and unless it were handled by a competent

commission with an iron hand, what would it look like?

It can be done and done at a very low cost and still look very well. Careful studies of each block should be made so as to do the least harm architecturally to the fronts and still maintain efficient traffic.

In a few instances it may be difficult, if not impossible, to make a pleasing appearance without considerable alteration in the front. But in the shopping district we see continual alterations and changes in store fronts to meet demands of new tenants or changed conditions.

What owner would refuse to alter one or two stories of his building front if he could rent two stores in the same building instead of one?

The pedestrian capacity of the Loop can be nearly, if not quite, doubled. There will be no waiting at street crossings; wide bridges will handle the crowds. There will be no boxes and barrels at the curb or tracks unloading merchandise.

The average height of the buildings can be sixteen stories and the caissons along the street will be built by the owners for their new buildings and not from the subway funds.

Vehicles Should Move in Defined Lines at Fixed Speeds*

BY WILLIAM G. BEARD

Yellow Cab Company, Chicago

AFTER studying traffic for years, we have come to the conclusion that the orderly movement of vehicles, rather than more room to move them in, is the solution of the whole problem. Traffic control, rather than wider roadway, is the thing.

No matter what improvements are put into effect—witness the widening of Sheridan Road—traffic tangles are not eliminated. The more room motor cars get, the more they pour into that room and the less carefully they drive. The more room you give them, the less supervision you can give them.

The Michigan Avenue signal system, which was our own idea and was paid for out of our own pockets, is the best proof I can offer of how engineering control of traffic has operated in a restricted area to speed up and order the movement of cars.

I have no doubt that many of you fretted and fumed at the Michigan avenue lights when they first were put into effect. I know I did and I had more or less to do with their installation. Of course, we had more or less of a selfish motive in getting them installed. Our cabs were moving too slowly. We were tied up in heavy traffic at the peak load of our business. Our wheels were not turning at the time when turning them would be most profitable.

Now most of this lost motion occurred between Twenty-second Street on the south and Lake Street on the north. On either side, traffic was compara-

tively unhampered. So, when Mr. Hertz proposed the light system, he made his offer to include those points.

Formerly, it took our cabs an average of twenty-seven minutes in the rush hour to get from Twelfth Street to Randolph Street. It took everybody else that long, too. Traffic was in a hopeless snarl all the time, regulated as it was from corner to corner.

TRAFFIC CONTROL INCREASES SPEED

Today, with one less lane of traffic through on each side of the street, the trip from Twelfth Street to Randolph Street takes a little less than eleven minutes, which is a net gain of sixteen minutes. And this was accomplished by making the street narrower for traffic. The turning lanes down the center of the street cut down the through lanes from four to three, while synchronous control, worked out by engineering brains, more than doubled the traffic capacity of the street.

We figure, among other things, that a taxicab engine idling will use up a gallon of gasoline per hour. This one stretch of highly traveled roadway, automatically controlled, saves us at least an hour a day per cab or 2,600 gal. of gasoline. What it saves us must necessarily be reflected in the savings to others.

However, such savings are beside the question of the tremendous importance of moving the traffic. There is no doubt in our minds that synchronous control of street traffic, affecting both the motor vehicle and the pedestrian, are eventual. Whether this will be controlled by hand or by clockwork mechanism, I am not prepared to say. But we are firmly of the opinion that automatic control is the thing and that it will be developed only by engineering brains.

We have proved among our own men that orderly movement at a slower speed makes for quicker delivery. In other words, slower driving in controlled lanes gets you where you want to be faster than speed and traffic running wild.

It is agreed that the present method of handling traffic is archaic. Every widely-used street in Chicago eventually must be put under a central control. The entire city can and should be timed from one or two spots where traffic is the heaviest.

If a single system, loose at both ends and without control as to its input can straighten out a traffic tangle and double its output in a given space of time, it stands to reason that a universal system would do a lot more. There are not going to be less vehicles, but more. And we cannot widen streets fast enough to take care of the greater number of cars. We can provide an orderly control that will do the only feasible thing, which is to make all vehicles move in defined lines at definite speeds and with definitely synchronized stops and turns. It is up to an engineer to do this.

Central Accountants' Meeting

THE annual meeting of Central Electric Railway Accountants' Association will be held at the Hotel Keenan, Fort Wayne, Ind., Feb. 29 to March 1.

*Abstract of paper presented before Annual Convocation Western Society of Engineers, Chicago, Feb. 6 and 7.

Various Suggestions for Easing Traffic Congestion in Chicago*

Ideas Expressed for Traffic Relief as Applied Are Suggestive for Use in Other Cities—Regulation of Pedestrian Movement Advocated—Signal System Has Made Street Crossings Safer

By Z. C. ELKIN
Chicago Motor Club

EACH class of transportation is to a certain extent dependent on every other class that may use the streets. For instance, you cannot hope to speed up street car traffic in the crowded area of the central business district unless you take motor vehicles and horse-drawn vehicles off the street car tracks, and you cannot speed up automobile traffic if you allow a major portion of the highway to be blocked with parked autos and wagons loading or unloading. The surface lines carry approximately 74 per cent of the street level passengers into the Loop and they constitute but 10 per cent of the vehicles, and any regulation must be based on the theory of the greatest good to the greatest number.

It is the purpose of this article to point out what the present facilities are and how they can be utilized to the fullest extent by a segregation of the different classes of traffic.

It is obvious that with the present trend of increased capacity of the buildings in the Loop, a greater load will be placed upon our transportation service. If this service is unsatisfactory today it consequently may be stated that additional buildings without increased transportation facilities mean additional congestion.

What we are constantly trying to do is to crowd the traffic into thoroughfares that were laid out to accommodate only a small fraction of the present number of vehicles. Major R. F. Kelker, Jr., expresses this thought in his report when he says:

There are about 9,500,000 sq.ft. in the Loop proper; that is the area bounded by Lake Street, Franklin Street, Van Buren Street and Michigan Avenue. Of this superficial area, 40 per cent was allotted for street purposes. Estimating roughly that each floor in a building has the same area as the lot on which the building is erected for the purpose of comparison, we find that if the lots are improved to an average height of five stories, the percentage of area for street use falls to about 10 per cent; for twelve stories the area of the street represents about 5 per cent; and for twenty stories, 3 per cent.

I simply call your attention to these percentages in a general way in order that you may more clearly realize that the increasing improvements in buildings with its resultant additional street business, points to absolute stagnation.

With the loop district less than half built up to the height allowed under the present ordinances and considering the present congestion, we can easily see that as population increases congestion must increase. It is doubtful if any means of transportation could be devised that would adequately handle the Loop traffic, when the time comes that this area is solidly built up to its capacity.

But it is also very doubtful if the Loop will ever be built up to the legal

limit. There is very distinct movement under way to expand the central business district, and as improved traffic arteries are opened up, new business districts similar to Michigan Avenue north of the bridge will spring up. We must not only prepare now for a much larger volume of traffic in the Loop, but also look forward to the time when the increase in the outlying business districts will carry a larger volume of through traffic through or around our present Loop district.

With streets laid out to take care of the horse-drawn vehicles of twenty-five years ago, it is unreasonable to suppose that we can continue to load them up with the ever-increasing traffic of today. It is beyond reason to suppose that we can widen the streets in the Loop to take care of the additional traffic, but we can make it possible to utilize the present streets to their fullest capacity and provide for a continuous flow of traffic into and out of the Loop.

This congestion can be relieved to a very marked extent by a just and proper regulation of pedestrian traffic.

PEDESTRIAN MOVEMENTS SHOULD BE CONTROLLED

There is no more reason for the pedestrian to be permitted to run wild on that portion of the street set aside for vehicles than there is for vehicles to drive on the sidewalk. A rigorous jay-walking ordinance will prevent pedestrians from crossing in the middle of the block, and they should not be allowed to cross traffic at street intersections where traffic officers are directing traffic. When the whistle blows for the movement of vehicular traffic in one direction, it will clear the corner much quicker if not interfered with by pedestrians.

Painting loading zones on the pavement at busy corners and allowing traffic to pass outside these loading zones while street cars are loading will not increase the hazard to the pedestrian. This method is being used to advantage in many cities.

According to some authorities, street cars in the Loop district move 3 miles per hour, and it is up to the city to clear the way for the cars to attain greater speed between street corners. The flow of traffic is held down to a snail's pace by horse-drawn vehicles which haul hundreds of thousands of tons of freight through the Loop that could be moved by means of the underground tunnel; and all fuel, ice, water, laundry and similar supplies for Loop buildings could be delivered between midnight and 6 a.m. with a decreased delivery cost in the time saved and at the same time relieve traffic conditions to a great extent.

According to Major Kelker's figures,

there is parking space in the Loop area for 3,800 cars, and the City Council has turned over to the taxicab companies more than 10 per cent of this space. There is no more reason for furnishing cab companies a permanent parking space in the Loop than there is for furnishing it to any team or automobile owner. These taxicabs would serve the public just as efficiently if they kept on the move as they do by occupying cab stands on the most important corners and streets in the Loop. One solution of the problem is absolutely to prohibit any vehicle from stopping in the Loop area except to load and unload, and prohibit delivery of merchandise and supplies during the heavy traffic hours.

Instead of bending all our energies to the problem of crowding practically all our traffic through the Loop, we should aid the development of outlying business districts, thus relieving the central business district. The plan of double decking streets and elevating sidewalks is ridiculous and impractical. The recent improvement of Michigan Avenue to the north shows that proper traffic outlets will solve the Loop congestion problem, and the increased valuation of property will pay increased taxes enough to pay for the improvements.

It is estimated that 25 per cent of the vehicles entering the Loop daily are through bound, so any attempt at the betterment of traffic conditions should include some plan to take this traffic out of the Loop proper to expedite that portion and relieve the already overcrowded streets of everything that does not necessarily have to stop in the central business district.

We have run wild on the question of "Through Streets," without any regard to the part they are to play in our ultimate traffic plan. Through streets should only be created when they are properly paved and lighted; when they actually "go somewhere," and provide an outlet for through traffic. They should only be created when they are part of a major plan for traffic regulation. With through traffic streets, the through traffic would not be held back by local traffic. It would be well to give serious consideration to extending the traffic signal tower system now in operation on Michigan Avenue not only on the boulevards but elsewhere in the crowded districts.

SYNCHRONIZED SIGNALS DISCUSSED

This tower signal system has probably slowed up traffic to a very slight extent as far as Michigan Avenue is concerned, but it has undoubtedly made traffic safer and it is also true that it has speeded up traffic from the cross streets entering Michigan Avenue from the Loop.

The greatest good it has accomplished is in teaching the pedestrians to wait for the signal before crossing the street, and a general extension of this system throughout the central business district will not only result in a large decrease in the number of accidents, but we believe will actually speed up traffic generally by educating the pedestrian to wait for the signal.

The time is ripe for a change in the police administration of traffic. The

*Abstract of paper presented before Annual Convocation Western Society of Engineers, Chicago, Feb. 6 and 7.

creation of a "Traffic Division" that would be city-wide in its operation, with a competent traffic engineer in supreme command, would be in order. The head of this traffic division should have jurisdiction over all the city, full control over all traffic regulation with full power to make any changes necessary in routing traffic. He should direct the placing of all traffic signs,

etc. The job is big enough to require the entire time of an expert with a competent corps of assistants.

Our present streets under the absolute direction of a competent traffic division would handle 50 per cent more traffic and give us time to partly catch up with the ever-increasing traffic requirements for more rapid transportation.

American Association News

Special Train New York to St. Louis

DEFINITE arrangements have now been made for a special train from New York City to the Midyear Meeting of the American Electric Railway Association at St. Louis on March 4. The train will be run by the Pennsylvania Railroad, leaving the New York terminal at 4:50 p.m., Saturday, March 1, as a section of the St. Louisan, arriving in St. Louis about 5 p.m. Sunday evening.

A special car from New England to be attached to the New York-St. Louis special train in New York City is contemplated; and the special will also pick up delegations from other cities at various points along the route. Arrangements are being made to provide entertainment for the party both Saturday evening and during the all-day run Sunday. Those desiring to join the party are urged to make reservations with Carl H. Beck, Westinghouse Traction Brake Company, 165 Broadway, New York; Cortlandt 8311.

Midyear Committee Keeps Things Moving

AT ITS weekly meeting on Feb. 1, W. H. Sawyer, chairman, and the local members of his committee on arrangements for the Midyear Meeting reported progress on all the details. Hotel reservations are coming in rapidly and are being taken care of at the Hotel Chase and neighboring hostleries. It was planned to invite the Louisville Inspectors Quartet as one of the entertainment features. It was agreed that practically all entertainment should take place during and not after the dinner.

Mr. Sawyer appointed the following on the Civic Host Committee: Rolla Wells, chairman; L. Wade Childress, W. Palmer Clarkson, W. Frank Carter, Herman C. Stifel, C. L. Holman, Louis H. Egan, F. E. Allen, Edwards Whittaker, George W. Neidringhaus, Breckinridge Jones, A. L. Shapleigh, F. O. Watts, Festus J. Wade, Clarence H. Howard, Henry Miller, H. J. Pettengill, Murray Carlton, Senator Selden P. Spencer and W. K. Bixby.

Purchases and Stores

A MEETING of the committee on purchases and stores of the Engineering Association was held at New York on Jan. 21, with the following present: J. P. Dick, chairman; J. F.

Fleming, C. A. Harris, H. H. Lloyd, A. A. Ordway, W. S. Stackpole, W. H. Staub, A. H. Kennedy, and E. L. Farris, visitor.

The subjects assigned to the committee are: (1) Method of classification and sale of scrap materials to increase the revenue therefrom; (2) proper place for the purchasing and stores department in a company organization; (3) review of existing standards.

It was decided that the second subject be interpreted to consist of the relations of the purchasing and the stores departments and their organization and control. In opening the discussion the chairman read an editorial from the January, 1924, issue of *Railway Purchases and Stores*, dealing with the functions of the supply department and emphasizing the need of keeping to a minimum the investment in materials and stores. All the members concurred in the ideas expressed in the editorial.

Mr. Lloyd suggested that a questionnaire be sent to all member companies regarding the position of the storekeeper in the railway organization, but it was brought out that a question in *Aera* had brought forth many answers which declared that the storekeeper should report to the purchasing agent.

A recommendation was tentatively adopted that the stores department should be under the supervision of a general storekeeper responsible for the custody, care and distribution of all material not in actual use, including scrap and reclaimed material; and that the purchasing department and the stores department should report to the same executive officer, if operated separately, or if operated as one unit then the storekeeper should report to the purchasing agent.

The committee then took up consideration of the first question, that of scrap material. Mr. Harris described the methods followed by the Pittsburgh Railways. Mr. Fleming called attention to a meeting held recently under the auspices of the United States Bureau of Standards, of representatives from the National Association of Purchasing Agents and the National Association of Waste Material Dealers, Inc., for the purpose of drawing up and agreeing on standard specifications for ferrous and non-ferrous scrap. Mr. Fleming also presented the standard classification for old metals, effective Nov. 1, 1923, as adopted by the latter body. C. A. Harris was appointed chairman of a sub-committee with Mr.

Fleming to draw up a tentative classification of scrap materials.

In accordance with a suggestion by Mr. Lloyd at a meeting of the purchasing agents and storekeepers at the Atlantic City convention last October, it was decided that each committee member should get in touch with the purchasing agents and storekeepers in his vicinity, and if possible hold a meeting prior to the next committee meeting to discuss their common problems, for the purpose of getting the views of other purchasing agents and storekeepers not represented on the committee.

It was decided to hold the next meeting at St. Louis on March 3.

City Operation and Interurban Operation

A JOINT meeting of the committee on city operation and the committee on interurban operation has been arranged for at Indianapolis, Ind., March 1, at 11:30 a.m. The place of meeting will be in the office of Harry Reid, chairman of the interurban committee, in the Wilde Bank Building.

It is expected that the regional vice-chairmen will have definite reports to make at this time.

Special Reports Available

SPECIAL reports and compilations on the following subjects prepared by the American Electric Railway Association staff during the month are now available to member companies upon request.

Trend of Electric Railway Fares, 1917-1923.—Shows the fares in effect in each of the 288 cities having a population of 25,000 or more in the years from 1917 to 1923, the average cash rate of fares in these cities in these same years and the number of cities in which each rate of fare was in effect in each of these years.

Electric Railway Franchises.—Analysis of eight electric railway franchises recently granted, giving a comparison of the provisions in each covering service, fares, return, taxes, conditions governing use of streets, paving, duration, forfeiture, renewals, etc.

Motor Vehicle Regulation.—A summary of court and commission decisions made under existing laws involving motor vehicle common carriers, both passenger and freight, covering such subjects as issuance of certificates of convenience and necessity, competition with railways, abandonment or extension of routes, through routes, service requirements, etc., preceded by an analytical index making possible ready access to decisions on all phases of motor vehicle operation.

Securities Issued by Public Utilities in 1923.—A list of the new securities issued, divided between electric railways and other public utilities, showing the type of security, amount issued, maturity date, interest rate and offering price.

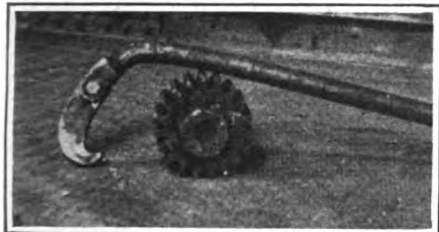
In addition to the above, supplements to the Wage Bulletin and Cost of Living Studies have been prepared, bringing them down to date.

Maintenance of Equipment

A Handy Pinion Tool

IN THE removal of the pinion nut from the armature shaft it is often very difficult to keep the armature shaft from rotating with the wrench. This difficulty has been overcome somewhat by the use of a tool which engages the teeth of the pinion and provides a purchase for holding the armature shaft during this operation.

This tool is the design of A. P. Bischmann, master mechanic Chicago & Joliet Electric Railway, and it is made up of a 4-ft. length of 1-in. pipe for a handle with a jointed hook at one end. The hook is made $\frac{3}{4}$ in. thick, of wrought iron, and shaped to fit in between the teeth on the pinion. The inside of the hook has a curvature corresponding to the addendum circle of the pinion.



Tool for Holding Armature Shaft as Nut Is Removed

The lower end of the handle also conforms to that curvature.

In practice, the hook engages a tooth of the pinion, the handle being brought around in the direction of rotation and held in one hand while pressure is applied with the other hand to the wrench engaging the nut. Thus it is possible for one man to perform this task.



Using Work Car to Plow Street for New Track

horse-drawn plows in order to make the trench for the new track. In these instances a hole was dug in the street by the men to give the plow a start and then a four-motor work car was used for motive power to plow the street.

A 12-in. x 12-in. x 18-ft. timber was chained across the body of the car and a special steel-constructed plow with a steel beam was attached to the timber with a chain sufficiently long so as not to pull the plow out of the ground. Trackmen held the plow and the car had no difficulty in plowing the street, as indicated in the photograph.

This work was done under a fifteen-minute headway with practically no delays to car traffic. Care was exercised by the work car motorman so as not to overheat the car resistances. The motors were used in the series position only.

Special Shapes for Tipped Tools

BY FRANZ SCHWOPE
Berlin, Germany

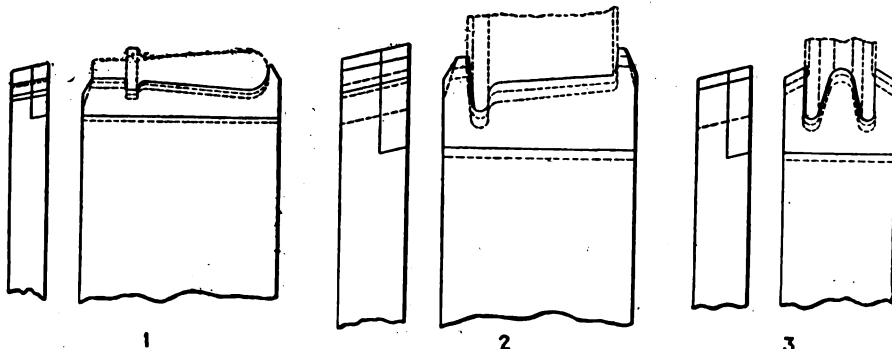
THE method of welding tips of high-speed steel to ordinary steel shanks, as described in the *ELECTRIC RAILWAY JOURNAL* for Aug. 11, 1923, has found extensive use in Germany with very good results. This is particularly true where special forms for the tips are needed. The accompanying illustrations show several special forms of tips which have been used to make a turning tool for metal handles, a tool for turning tires of car wheels and a turning tool for trolley wheels. Such tools are easy to handle, and a single turning operation enables the work to be particularly well done. Also, much time is saved by having tools made to the particular form desired, since

Plowing Track Trench with Work Car

BY W. L. WHITLOCK

Superintendent of Way, Denver Tramway

DURING the years 1921 and 1922 the way department of the Denver Tramway constructed a second track on certain streets where a single-track line was in operation. In several instances the streets were surfaced with a mixture of slag, gravel and loam that had "packed" through years of use so that it was almost impossible to break it with



Special Forms of Tips Made of High-Speed Steel and Welded to Ordinary Shanks
No. 1—Turning Tool for Metal Handles. No. 2—Tool for Turning Tires.
No. 3—Tool for Turning Trolley Wheels

in turning with an ordinary tool several measurements would be necessary on each piece of work, while with tools of the form shown no measurements are necessary after the tool is once constructed.

Testing Bus Engines with Dynamometer

By P. V. C. SEE

Superintendent of Equipment Northern Ohio Traction & Light Company, Akron, Ohio.

THE usual method of running in a gas engine after it has been overhauled in the average garage is to put it into the automobile and drag the automobile around the streets with another car until the bearings are worked in. The automobile manufacturing plants and the larger automobile maintenance companies are using an electric dynamo to run the overhauled engine against so that they can adjust the engine and make sure that it is able to develop its full rated horsepower.

When the bus engines of the Northern Ohio Traction & Light Company became old enough to require overhauling, it was felt that such a device was needed so as to make sure that when the engine was once put into the bus it would be in perfect adjustment. But it was soon found that the cost of a factory dynamometer was prohibitive.

It was therefore decided to design and build a testing set in the shop from equipment on hand. The company has a great many old GE-67 railway motors, of 50-hp. rating.

These are, of course, series wound, so that it was necessary to rewind the fields for shunt operation. These fields were wound with No. 22 double cotton covered wire, enough turns being placed on the fields so that they could be connected directly across the trolley circuit with a field rheostat in series for adjustment. Six banks of safety car resistance grids were connected in series with the armature, to permit of operation at very low speeds. An ammeter and voltmeter were connected up in the motor circuit.

The procedure for testing an overhauled bus motor is to mount it in an I-beam frame and connect it up with flexible fabric joints to the rebuilt motor. The motor is then started as a shunt wound motor with the use of an ordinary K-6 street car controller. The first notch of this controller will run the motor at a speed of about 100 r.p.m. Speed is read by a tachometer connected to the motor.

This arrangement obviates any necessity of cranking the gas engine. It is then run at this low speed for several hours to make sure that none of the bearings are too tight. A small gasoline tank having been connected to the carburetor, the ignition is turned on, so that the gas engine starts to operate itself. A switch is thrown into the reverse position, transforming the motor into a shunt-wound dynamo. The engine is then allowed to develop in the neighborhood of 10 hp. against the safety car resistance.

As a final test, the carburetor is

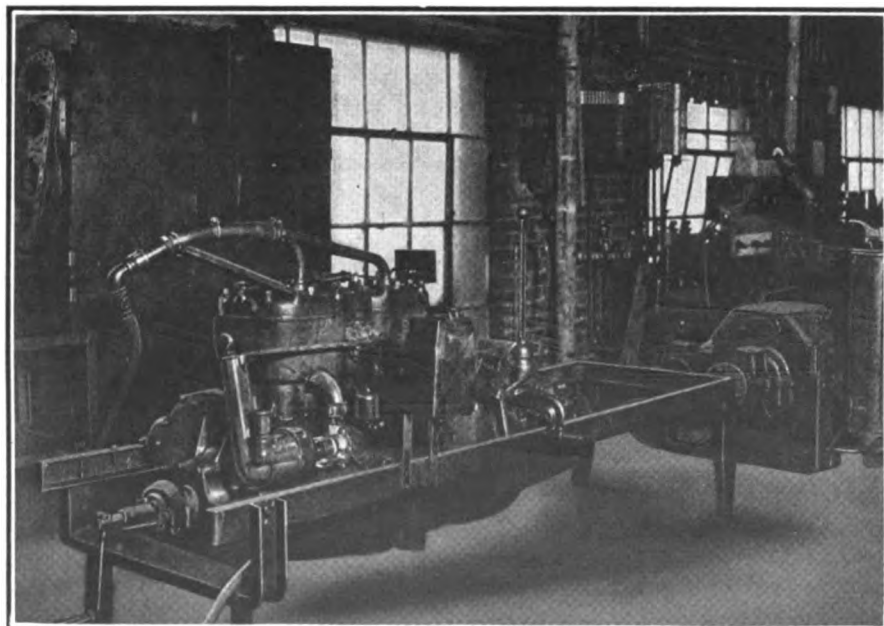
opened wide and the engine is allowed to develop its full power. Any adjustments that are necessary on valves, carburetor, etc., can be done on the testing block instead of in the bus, so that when the engine is ready for installation it is sure to be in perfect shape.

Cars Spray-Washed in Evansville

THE Southern Indiana Gas & Electric Company, which operates the city cars in Evansville, Ind., uses a simple spraying device for washing safety cars.* One of the



This Form of Spray Washer Used in Evansville, Ind., Is Simple and Effective



This Dynamometer for Testing Bus Gas Engines Uses a Rewound Railway Motor for Load

tracks in its principal carhouse is assigned for washing purposes, and on each side of it a spray pipe is suspended from the roof trusses. This is of 1½-in. pipe size and it is filled for 8 ft. from its lower end with holes about ¼ in. in diameter and 1 in. apart drilled in a straight line. When it is in operation the sprays are adjusted so that they overlap, as shown in the accompanying illustration, when the car is not between the pipes. A control valve is located behind the brick pilaster seen at the right in the picture.

In the washing operation the car is passed slowly through the water jets twice, a period of five minutes being occupied in the process. The officials of the company are highly pleased with the operation of this device, which was installed by the master mechanic, A. Newhouse.

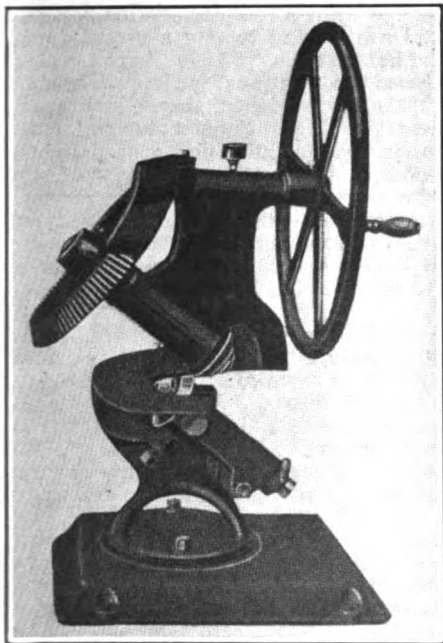
*See issue of this paper for Oct. 28, 1922, page 705, for a description of the practice of the Detroit Municipal Railway along this line.

New Equipment Available

Rotary Type Sheet Metal Shears

A NEW line of shearing machines is being marketed by the Marshalltown Manufacturing Company, Marshalltown, Iowa, under the trade name of the Throatless Shears. These are of a rotary type built in several different sizes, the largest having a capacity for $\frac{1}{2}$ in., and the smallest for No. 18 gage and lighter sheets. The shears are built for hand power, belt and motor drive, and the three smaller sizes can be furnished with or without pedestal.

Some of the particular features of these machines are their ability to cut sheets of any size and they are adapted for cutting in and out curves, complete circles, or straight splitting. The head of the machines and the essential parts are made of cast steel. The cutters are set al-

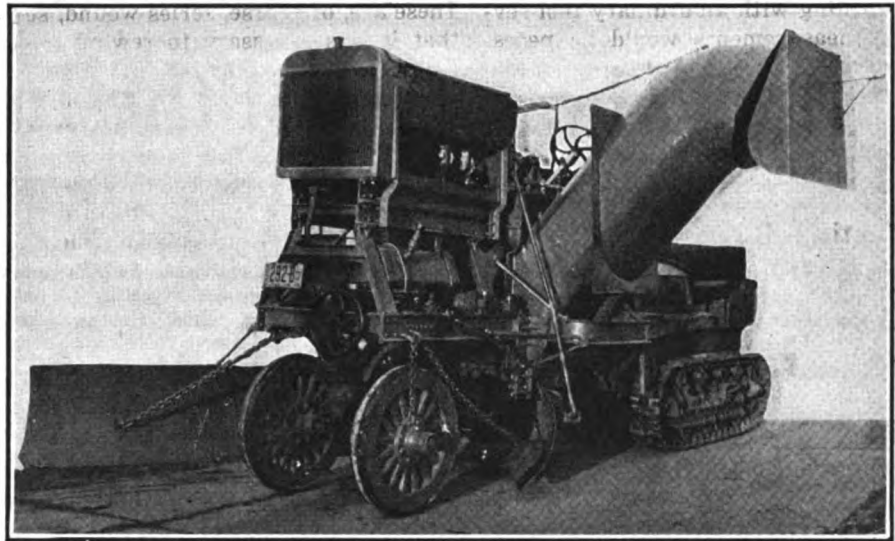


Rotary Type Shear for Sheet Metal Work

most perpendicular and are made of special tool steel $1\frac{1}{2}$ in. thick and 10 in. in diameter, tempered. One of the cutters is knurled and driven, which makes the shears self-feeding.

With motor drive, a friction clutch gear enables the operator to stop the shear with the motor still running.

The machine shown in the illustration is the No. 12-BH size with a



This Plow and Loader Collects the Snow and Discharges It Through Deflectors Into Loading Trucks

capacity of No. 12 gage and lighter. It is shown arranged for bench mounting and hand power, but pedestal mounting and either belt or motor drive can be furnished.

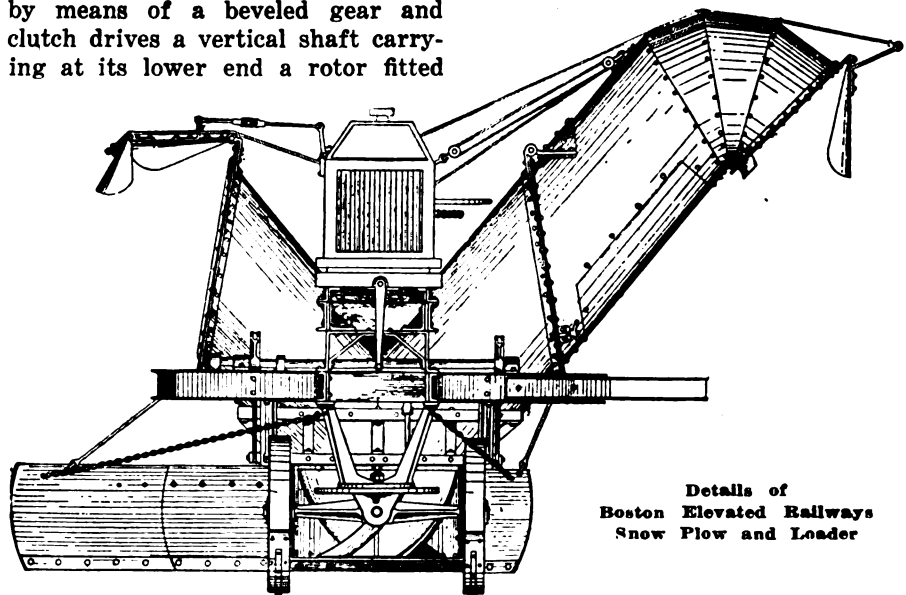
Snow Plow and Loader in Boston

THE Boston Elevated Railway has recently purchased the rotary snow plow and loader shown in the accompanying illustrations and built by the Eastern Tractors Company of Boston. This machine is propelled by a tractor with a 40-hp. motor and can be used either as a plow, with wings, or as a plow and loader. As a plow, it has a capacity of about 4,200 cu.yd. per hour, and its loading capacity is about 480 cu.yd. per hour.

The loading apparatus is driven by an independent four-cylinder gasoline engine of about 60 hp., which by means of a beveled gear and clutch drives a vertical shaft carrying at its lower end a rotor fitted

with high carbon steel intake blades. This rotor is 34 in. in diameter and runs at 1,000 r.p.m. and its blades gather up the snow and propel it through a deflector to any point desired. It is claimed that these rapidly rotating blades will pulverize lumpy or frozen snow so that it, with the light snow, is carried almost instantaneously from the street line to the loading truck. Slush is also handled as well. Two men are required to operate the plow and loader, one driver and one lever man.

The tractor can easily be detached from the plow, if desired, so that it can be used in warm weather or at other times for any other service, if desired. The weight of the machine, when fitted with a 5-ton tractor, is about 15,000 lb. It has a length of 19 ft. over all, width of 74 in. and height out of service of 6 ft. and in service of 8 ft. 6 in.



Details of
Boston Elevated Railways
Snow Plow and Loader

The News of the Industry

Jersey Fare Unchanged

Results Now Unsatisfactory, but Management Hopes Economies and Co-ordination May Help

Thomas N. McCarter, president of the Public Service Corporation of New Jersey, with several associates had a comprehensive discussion with the members of the Board of Public Utility Commissioners on Feb. 7 on all the problems facing the development of service rendered by the operating companies in the Public Service group, which include the Public Service Railway, the Public Service Electric Company and the Public Service Gas Company.

Attention of the board was directed to increase in size of the financial picture involved in the proper development of these properties, which includes capital requirements for this year of approximately \$34,000,000. Assurance was given that at the proper time a plan would be presented to the board for improving the corporate structure of the companies so that the large financing could be more economically accomplished than under a continuance of hitherto existing methods, which are not adapted to matters of such magnitude.

Mr. McCarter further told the board that notwithstanding the fact that the 5-cent fare, which has been in effect during the trial period, had caused the railway a very substantial loss, he was of the opinion that it should be continued at least for the present until further results under it were available. He added that there is good reason to hope that certain changes and economies and the co-ordinating of bus and railway service may make it possible to continue this rate indefinitely.

\$2,500,000 A YEAR SAVED TO PUBLIC

It was further stated by Mr. McCarter that in the judgment of all connected with the companies the present rates for gas and electricity are not affording a full return upon the value of the property devoted to the public use, either by the gas company or the electric company, and that a proper valuation of the respective properties would so demonstrate; however, the ascertainment of such valuation would require a long time and involve much expense and that after a careful study of the respective companies' finances and those of the whole Public Service financial structure, the directors were satisfied that some substantial reduction could voluntarily be made by the company, both in gas and electric rates without interfering with the financial necessities of those companies. Accordingly a promise was made that within a reasonable time the companies would submit in writing their views of what reduction they could make along

these lines and would further submit the pertinent data upon which such views were based.

The reductions which the company has in mind would save to the consumer

of the gas company approximately \$1,000,000 a year and to the consumers of the electric company approximately \$1,500,000 a year, or a total of \$2,500,000 a year.

Akron Bus Men Ask Seven Cents

Find Nickel Fare Unprofitable—City Negotiating a New Franchise with Bus Operators—Accidents on Increase—Weather Favors Auto Operation

BUS men operating in Akron since Feb. 1 have appealed to the city for permission to charge a 7-cent fare, claiming they cannot make expenses at 5 cents. The city is negotiating with a New Jersey bus firm for a new franchise. The bus operator is asking a minimum fare of 7 cents. The bus service at the close of the week is no better than it was on the first day street cars ceased running.

H. S. Firestone, of the Firestone Tire & Rubber Company, has given the motorization plan his financial backing. A mortgage for \$30,741 has been made to the Firestone Company by the new Akron Rapid Transit Company to cover eighty Fords turned over to the company by Firestone.

Numerous minor injuries have followed in the wake of the attempt to motorize the city, but fortunately no serious injuries have resulted. Weather conditions, with the exception of light snow Thursday, are still favorable to bus operation.

Akron closed the first week of its "exclusive" city bus transportation with severe cold weather and much worse transportation service than on Feb. 1, the day railway service was removed. Between sixty and seventy buses, seating from eight to eighteen passengers are in service, most of them furnished by the Cleveland-Akron Bus Company from equipment previously retired from service. They are supplemented by about eighty-five jitneys.

Early on Sunday morning, Feb. 3, the city police and members of the street department, acting under orders of Mayor Rybolt, placed trucks and street sweepers on all interurban tracks of the Northern Ohio Traction & Light Company at or near the city limits. This action was taken under cover of darkness. The company learned of the city's action after the early morning runs had left Silver Lake Junction, Canton and Kenmore. The trains were stopped before the obstructions were encountered. Application was made at once to a state court for an order restraining the city from interfering in any way with further operations of suburban and interurban cars. Service was resumed at noon through the city. All the company's buses were used Sunday forenoon to transfer passengers

across the city between interurban and suburban lines.

On Monday the company carried page "ads" in Akron papers telling of the blockading of the tracks, pointing out that the criminal laws of the state had been violated and the lives of hundreds of innocent passengers jeopardized. "Was this done to save the car riders of Akron a penny?" the advertisement asked.

Monday the idle trainmen, shopmen and roadmen circulated petitions addressed to the Mayor and City Council in which they said:

"We want street-car service restored and are willing to pay a 6-cent fare."

The first day 23,000 Akron voters signed the petitions and approximately 20,000 more signed them during the next two days. Some industrial institutions signed 100 per cent. In the Goodrich plant 70 per cent of the Akron employees signed. The car-men were refused entrance into the Goodyear and Firestone plants. They were told by employees of these plants who were accosted on the outside that they had been warned against signing the petitions on the penalty of dismissal. After a bitter fight the Goodyear "Senate" adopted a resolution favoring the bus.

On Wednesday Mayor Rybolt announced he would "motorize the city at all hazards." The plea made to the people is that they "ought to put up with any suffering in an effort completely to motorize the city, because Akron, being a rubber city, should lead the way." It is pointed out by Mayor Rybolt and Mr. Firestone that if Akron is completely motorized, other cities will be forced to follow.

Meanwhile the Mayor is saying in public statements that he was forced to provide transportation on a day's notice and that if given time he will finally get a sufficient number of buses to meet the needs of the people.

Two weeks before the cars stopped the Mayor said in a public statement:

"We will have the finest transportation system in the world on a 5-cent fare, with free transfer, on Feb. 1, when the cars stop."

This accounts for some of the present dissatisfaction and public condemnation of what is termed "the Mayor's Bus System."

Conditions Acute in Oklahoma

Railways in Both Oklahoma City and Tulsa Are Confronted with Trying Problems

Important developments are expected soon in connection with the existing situations with respect to railway affairs in both Oklahoma City and Tulsa. In Oklahoma City the question is: Who, if any one, is to continue operating the city lines? In Tulsa the question is: Will the State Legislature pass a bill intended to remove in whole or in part the jitney curse?

The Oklahoma Railway operates city lines in Oklahoma City and the interurbans between Oklahoma City and Guthrie, Oklahoma City and El Reno and Oklahoma City and Norman. That company failed to earn interest on its bonded indebtedness in 1923. John W. Shartel, president, announced several months ago that the company could hope to continue operation of the city lines only through such benefit as would accrue to it from an increased fare, revision of traffic ordinances to permit speeding up of service, and curtailment of service on certain lines.

Mr. Shartel's presentation of the facts to the City Commissioners failed to bring any definite evidence of willingness on their part to co-operate with the railway in solving the problem confronting it. The City Commissioners let it be known informally that they would not oppose any rate revision that the State Corporation Commission, after investigation, might hold the railway to be entitled. There was an unwillingness to revise traffic laws or otherwise co-operate. The company stated that operation of the interurban lines was sufficiently profitable to present no baffling problem, but indicated its intention to appeal to the State Corporation Commission for permission to abandon service and dismantle the city lines.

The company has indicated its willingness and desire to turn over to the city or to a committee representing civic organizations or to any group of citizens willing to undertake the operation of the city lines under a trusteeship, limited as to duration, the full management of the property and service, looking to the possible working out of some permanent plan. As yet, however, the company has not filed its threatened application for permission to abandon and dismantle the city lines.

In Tulsa that city's newspapers are attempting to convince the public that the jitney competition must be done away with if railway service there is to continue. Heretofore there has been no state law under which city officials have had authority to prevent or restrict jitney competition with electric railways of the city. A bill introduced into the House makes automobiles operated for hire within cities subject to reasonable regulation and control by cities, but prohibits the cities from enacting or enforcing unreasonable or oppressive ordinances. The bill has been passed by the lower house and is pending in the Senate.

This bill provides that regulation by cities may include the requirement of insurance to protect the public, but provides that no city shall charge an unreasonable occupation tax nor enforce any regulation clearly prohibitive in character. It provides that the city may exclude the operation of automobiles for hire upon and along streets occupied and used by a street railway paralleling the same, and upon and along the first two streets on either side of a street occupied and used by a street car line. This action, however, does not pertain to automobiles

operating under a state permit issued by the Corporation Commission authorizing service between towns or cities.

This measure seems to be sufficiently indefinite to be of only limited value as a protection to electric railways. So far as the larger cities are concerned it would seem not to be difficult to evade the law entirely by making one terminus of the jitney line outside of the limits of the city. The Tulsa jitney interests are at the capital for the purpose of preventing the adoption of any drastic regulation of their operations.

Mr. Sawyer Speaks of Buses and Taxes

Tells St. Louis Business Men Unfair or Undue Competition Is Ruinous Not Only to Companies, but to the Public Served—Invites Them to Attend Midyear Meeting

W. H. SAWYER, president of the East St. Louis & Suburban Railway, East St. Louis, Ill., addressed the Electrical Board of Trade of St. Louis, Mo., on Jan. 29 on various aspects of the electric railway situation. One or two excerpts from his address may be of general interest to electric railway men, his talk being primarily for the purpose of enlightening local business men. In regard to the competitive situation between railway and bus in St. Louis, Mo., Mr. Sawyer had this to say:

"City transportation must, from an economic standpoint, be a monopoly. Unfair or undue competition is ruinous, not only as the final answer to the companies but to the public served. I hold very definite views along this line. I am using gasoline-driven buses. I am using them because for the place and the purpose intended they are better than electric street cars, but there is no place over on the east side for a separate bus company paralleling our tracks and taking away the cream of our traffic.

TRANSPORTATION SHOULD BE CO-ORDINATED

"Do not misunderstand me. I am not criticising the receiver of the United Railways because legal counsel in its wisdom ruled that a receiver has no right to operate buses; nor am I criticising Dick Meade, the president of the People's Motorbus Company, from whose public relations policy I have learned many lessons. But buses as operated today in St. Louis are wrong, uneconomical and fundamentally unsound. No one can tell me that it is good business to have buses operating on Washington Avenue on a cold winter's night, competing with the street cars running alongside for a few straggling passengers. The public has to pay too high a price for such duplication. So long as the buses and street car systems continue to be operated in St. Louis as they are today, we have not a co-ordinated transportation system, and a co-ordinated transportation system is essential for the best interests of civic welfare and the riding public.

"At least this is my own personal thought, and if any one cares to differ with me, that is his privilege. But I

am perfectly willing to have it written on the record definitely that competitive, unco-ordinated systems of transportation, serving the same streets in the same district, in the same community, are fundamentally unsound, and that goes whether it refers to bus competition in St. Louis or elsewhere."

Later, in his talk, Mr. Sawyer turned to the subject of taxation. He called attention to the fact that the United Railways of St. Louis pays in direct taxes, federal, state, county, municipal, school, franchise, and mill tax, and similar items, a total of more than \$1,850,000 a year. It carries approximately 285,000,000 adult paying passengers per year. He said that this meant that every one of these passengers pays in his 7-cent fare over 0.6 cent for direct taxes. Every passenger pays $\frac{1}{2}$ of a cent for franchise tax, which is purely a relic of the days when franchises were company assets which could be capitalized and sold. The car rider in St. Louis pays 0.1 cent for the mill tax, which he said was unfair and discriminatory, in that the car rider is taxed through the mill tax for the benefit of the city at large.

Mr. Sawyer said that the gross earnings from operation of the United Railways is approximately \$20,000,000 a year. This means that 9 cents out of every dollar taken in from street car fares is paid out for direct taxes. He asked the business men present what they would think if they had to pay out taxes at that ratio.

Referring to indirect taxes, Mr. Sawyer said that local street car riders could have a 7-cent cash fare and 6 $\frac{1}{2}$ -cent ticket fare and provide the company with the same net that it now has if the company were relieved of the paving tax, which amounts to \$685,000 a year.

Adding direct taxes and the indirect paying tax together, Mr. Sawyer pointed out that one-eighth of all the revenue from electric car rides is paid out by the company for taxes—12 $\frac{1}{2}$ per cent. He referred also to the necessity of carrying policemen and firemen free and said that this cost the other car riders \$100,000 a year. He asked why it should not be expected that the clothing man give away uniforms to the policemen and firemen, the shoeman provide them with shoes, and the grocer

give them food, so that the city might benefit.

Mr. Sawyer concluded his remarks with the following:

"The electric railways have been damned and a lot of the damning was coming to them, but efficient operation, fair dealing and a broad public relations policy, coupled with newspaper advertising, is rapidly and rightfully changing the public attitude. The electric railway executives of 1924 merit the respect and the confidence of you other business men. I know these executives and I want you to know them. That is why I want you to come around to the American Electric Railway Association midyear meeting at the Hotel Chase on March 4, 1924."

Electrification of Staten Island Lines Discussed

Plans for the electrification of the Staten Island Rapid Transit Railway and the Staten Island Railway Company lines on Staten Island, N. Y., were outlined by R. D. Wright, general manager of the first-named company, at a hearing before the Public Service Commission in New York City on Feb. 8, Chairman Prendergast presiding. According to the statements of Mr. Wright, if the proposed electrification plans go through, the trains of these two companies will be operated to Brooklyn under New York Bay via the tunnel now being constructed, there to connect with the lines of the Brooklyn-Manhattan Transit to Manhattan Island. In order that this may eventually be done, the Staten Island lines will be equipped with 600-volt direct-current supplied by a third rail, this being the power now used by the B.-M.T. Energy will be purchased, it is said, unless present negotiations for buying power fail. In this event the companies will furnish their own energy.

At the conclusion of the hearing Chairman Prendergast assured the railway representatives that the commission's decision on the desirability of the electrification method outlined would be forthcoming at an early date so that the plans of the companies may proceed.

Twenty-six Cents More an Hour Asked in Des Moines

Union trainmen employed by the Des Moines City Railway have filed thirty-day notice of a request for changes in wage and working conditions at the expiration of the present agreement on March 1.

An increase to a maximum of 80 cents an hour is the principal demand. The present maximum is 54 cents an hour, granted in the so-called Owen award of nearly two years ago. At that time the men protested against the award of the arbiters, but on account of the contract provisions finally accepted the terms.

The new wage demands provide 74 cents for the first three months of service, 77 cents for the next nine months and 80 cents over one year. F. C. Chambers, president of the company, has made a counter proposal naming 44, 47 and 50 cents for the periods specified.

In all, the trainmen's proposal covers twenty-seven different points. Among the other demands are time and a half for Sundays and holidays, with eight hours as a basic day; seven days vacation on full pay each year; inclosed compartments for motormen and the placing of large disks back of block lights.

In the event that the men and the company are unable to arrive at an understanding the matter will go to arbitration in accordance with the terms of an agreement existing between them.

Rosalie Retires

Incarcerated in Police Garage to Await Further Developments in Oakland Fuss

Oakland's one-man cars are still running, but the city's one-man bus, which has been municipally operated for the past four months, has ended its runs and is now laid up in a police garage awaiting further developments.

The abandonment of city bus service was involuntary. It was forced by the refusal of the city auditor to pay the bill for the Rosalie, as the Safety Coach was called by its sponsors, Mayor John L. Davis and Commissioner William Moorehead.

In turning down the bill of \$8,250 for the bus, presented by Mr. Moorehead in behalf of the builders, the auditor ruled that the Rosalie had been illegally acquired in that competitive bids had not been called for, as provided by the city charter. He ruled further that the words "Safety Coach," as applied to the Rosalie in the bill of sale, constitute a trade name, thus pinning the city down to the purchase of a particular type of bus, which is contrary to the Oakland laws.

Commissioner Carter, one of the majority members of the Council who has opposed the operation of the Rosalie from the start, expressed public opinion when he said:

This is the result of jumping into something in a hurry, without taking time to learn what is proper legal procedure. The city's motor transportation venture, apparently, was not thoroughly planned. It has been a regrettable venture.

Commissioner Moorehead called it "petty politics." He added:

We have decided to withdraw the bus from service until a definite decision has been made as to its payment. The purpose of its purchase was to better transportation conditions in Oakland. This we have done. In the four months the bus has been in operation it has traveled about 18,000 miles, carried 60,000 passengers and cleared \$600 over and above expenses.

In the meantime the question has arisen: Who gets the \$600?

When the Rosalie appeared on the streets its sponsors were very enthusiastic. They predicted that the coach was merely a forerunner of a whole fleet of city buses. It was even pictured to press and public that the time had arrived to tear down trolley wires, rip up the tracks, end the so-called traction monopoly and have the city go into the transportation business on a big scale.

These views, however, met with a cold reception from the people of Oakland. Many improvement clubs passed resolutions hostile to this plan and

the Mayor was advised to "go slow." He and Mr. Moorehead, however, campaigned for their project and lined up one newspaper with them. The other three members of the Oakland City Council opposed the proposition and were backed by the City Auditor, who has refused to sign all warrants for expenses incurred in the operation of the bus.

The bus was a direct challenge to the one-man cars, to which the Mayor and Moorehead are violently opposed. The cars, however, were approved by the State Railroad Commission and they have since been put on six months probation in Berkeley, where an ordinance forbidding their operation has been lifted for that period.

Want One-Man Operation in Springfield, Ohio

Springfield, Ohio, may adopt one-man cars as the best method of bolstering its street railway system, which has not had a profit for some time. Officials of the Springfield Railway have told members of the City Commission that they must have some relief if they are to continue operating.

Under present conditions the railway company pays \$500 a month to the city in franchise taxes, paves between its tracks and furnishes first-class service on all lines. The City Commission is considering the proposition and will examine the results of one-man car operation in other cities before arriving at a decision.

One-Man Car Praised at Hearing in Sioux City

The one-man car has come to stay in Sioux City, Iowa, as long as the present fare of 6½ cents is in effect. This was the declaration of W. J. Bertke of the Sioux City Service Company before approximately 200 citizens who attended a hearing before the City Council.

It was brought out that since the investigation was started the company has maintained an extra car to Leeds during the rush hours when people are returning home from their work in the evening; that smoking on the cars is gradually being eliminated, and that the "school car" from Leeds has not been so overcrowded for a few days, as a "tripper" has followed and picked up the overflow patrons.

After hearing all complaints, Mayor Short summed up the situation as centering on the one-man cars.

C. M. Feist, master mechanic of the Sioux City Service Company, discussed the economic value of the one-man cars. He pointed out that the one-man car reduced operating costs, cut down accidents and enabled the company to exist on a paying basis. He declared that there were 34 per cent fewer accidents with the one-man car than with the two-man car.

Mr. Bertke stated that the company put on all the cars it possibly could and tried its best to accommodate the public. He said that the company runs between 90 and 100 cars on its lines between 5 and 6 o'clock every evening.

The investigation committee will be continued.

New York City Would Disclaim Responsibility

The plea that New York City is not responsible for injuries caused by its trackless trolley system on Staten Island was put forth as a defense this week in the trial of a suit against the city for \$75,000 for negligence. The plaintiff, Mrs. Eva Chrampanis, alleged that her husband, while riding a bicycle on the right side of the road on March 10, 1923, was killed by careless operation of one of the municipal trackless trolley buses, which run on Richmond Turnpike and other streets on Staten Island.

No defense alleging contributory negligence was set up. Instead, the city attorney put forth the claim that the State Court of Appeals had decided the city had no right to operate the line. Hence the city is not responsible for accidents. The presiding judge upheld this plea and took the case from the jury.

If this defense of the city is upheld by the court when the case is again tried in the Supreme Court, plaintiff's counsel avers he will include Mayor Hylan and other city officials in an amended complaint, holding them personally responsible for the operation of the line. He also said he might probably institute injunction proceedings restraining the city from further operation of the line unless he is assured by the city officials that they will obtain from the Legislature the proper authority to maintain and operate the trackless trolley system.

Indiana Union Suffers Serious Accident

A head-on collision occurred on Feb. 2 on the Union Traction Company of Indiana between Fortville and Ingalls. It resulted in the death of thirteen persons certainly, and perhaps three or four others, and the injury of a number of other persons. Each train consisted of a motor car and trailer. All cars were of wood, and took fire. Three of them burned, thereby causing several of the fatalities. The statement made by President Brady on Feb. 3 to the press follows:

The investigation of the cause of the deplorable accident has not been completed. The collision was between Train 21 westbound and Train 24 eastbound. The regularly scheduled meeting point of these trains shown by the official time-tables in the hands of all trainmen is at Siding Mur, which is at the east edge of Fortville. It is the duty of each train to remain at the regularly scheduled meeting point until the opposite train has been met.

The accident occurred east of Siding Dent, which is about 1 mile east of Siding Mur. The dispatcher's records show an order to Train 21, the westbound train, to meet Train 24 at Dent. They show no order to Train 24 to proceed east of Mur, the dispatcher stating that on the arrival of Train 24 at Mur and the non-arrival there of Train 21 he expected on telephone report by the No. 24 trainmen to give them an order to proceed to Dent, and there meet Train 21.

Train 24 did not stop at Mur, but proceeded past Dent, and thereby collided with Train 21, which was proceeding to Dent as authorized by its order. The trainmen on Train 24 say that they received an order at Lawrence directing the meeting of Train 21 at Goul, which is about 9 miles east of Fortville. The order actually received by these trainmen is supposed to have been destroyed by fire, but the records of the dispatcher do not bear out the statement of the trainmen as to this order. The investi-

gation has not been completed, and may not be for a few days.

The automatic block signals between Mur and Ingalls were not in operation Saturday, and had not been for some days, and this fact had been bulletined to all trainmen on the Indianapolis-Muncie line, and was understood by them. The non-operation of these signals was due to work on the high-tension transmission line between Fortville and Ingalls. The block signals are a delicate apparatus and it is not unusual for them to be inoperative for short periods because of transmission line work or other causes. In such cases it is the well understood practice to bulletin the fact to trainmen, notifying them to disregard signals until notice of their being again in operation is given. It was expected to have the Mur signals in operation again by Monday or Tuesday.

The motormen on both trains were experienced employees, one having been in the service of the company for twenty-five years, and the other for fourteen years. They were regarded as trustworthy and well qualified men.

Improvement Program Announced

A tentative program announced by the Department of Street Railways of the city of Detroit includes extensions, improvements and rehabilitation of street railway lines and equipment estimated to cost between \$1,250,000 and \$2,000,000. It is planned to commence the work in the spring and it is estimated that the extension program will take about two years to complete. It is planned by the commission to spend such amount of money as is made available out of the \$5,000,000 bond issue voted by the electors of Detroit last April, and at the same time continue financing its rehabilitation program from the earnings of the system. As approximately \$900,000 is available annually for rehabilitation purposes, the total to be spent during the next two years, including amounts from bond sales and earnings, will approximate \$3,000,000.

Twelve new lines or extensions are proposed, the most of which will be extensions into new city territory not now served by the street railway lines. Plans for the track extensions have been completed and only the Mayor's and the commission's approval are needed.

Republican's Transit Bills in New York Legislature

Majority Leader Simon L. Adler of Monroe County on Feb. 6 introduced in the Assembly a bill amending the public service commission law adding a new article eight creating a board of transportation for the city of New York to consist of three members to be appointed by the Mayor of the city of New York.

The bill reflects the Republican idea on transit matters. It was introduced as a party measure ahead of the Democratic bill, which has not yet made its appearance. The measure does not abolish the present Transit Commission, but transfers to the newly created body jurisdiction over subway lines and allows the city of New York to operate itself lines which have been on a paying basis for a period of two years. There is no 5-cent or any other specified rate in the bill. On the other hand, provision is made for adjusting the fare charged so as to meet certain requirements of earnings, fixed charges, interest, amortization of securities, etc.

Guilty Employees of International May Appeal

Federal Judge George S. Morris, who presided at the trial of the four striking platform employees of the International Railway, Buffalo, found guilty of conspiracy in connection with the dynamiting of the Buffalo-Niagara Falls high-speed line train at Ellwood during the strike in August, 1922, signed a writ of error which enabled the four convicted men to appeal to the United States Circuit Court of Appeals. They have been released under \$20,000 bail each pending the appeal to the Court of Appeals.

The trial of State Senator Robert C. Lacey, John M. Parker, president of the Buffalo local of the Amalgamated; Clarence F. Conroy, business agent, and Vincent Tuero, financial secretary, on charges of conspiracy in connection with the dynamite outrage, has been adjourned until the March term of United States district court. Additional charges of a more serious character have been brought against several of the alleged conspirators in the dynamite outrage by the Niagara County authorities.

Edward C. Sands of Buffalo, another striking platform employee of the International, was indicted by the Niagara County Grand Jury on charges of burglary, larceny and criminally receiving stolen property in connection with the theft of large quantities of dynamite in Niagara Falls just previous to the dynamite outrage on the Buffalo-Niagara Falls high-speed interurban line at Ellwood Station in August, 1922. When arraigned before Judge Charles Hickey, Sands pleaded not guilty and was released on \$2,000 bail.

Hearing Brings Out Defects of New York Home Rule Measure

Another hearing at Albany appears to be likely on the so-called home rule measure for New York State. At the hearing on Jan. 30 under the auspices of Governor Smith's Home Rule Commission critics of the measure said that under the provisions of the bill as drawn mayors would become petty czars, local legislative bodies would be in a position to perpetuate themselves in power indefinitely, regardless of the popular will, and taxpayers would be at the mercy of spendthrift city administrations. However, praise was mingled freely with censure. Practically every one who appeared to criticize had words of commendation for the painstaking labors of the Home Rule Commission in the difficult task confronting it.

The Home Rule Commission is composed of Republicans as well as Democrats, with the latter, however, in the majority. Its chairman is James J. Hoey. He has said he was greatly impressed with many of the recommendations which were made at the hearing and intimated that possibly the bill, when revised, would come up for discussion at another public hearing prior to its introduction in the Legislature.

Financial and Corporate

Cleveland Goes Behind

Receipts Under Service at Cost with Five-Cent Fare \$1,147,159 Less than Expenditures

Expenses of the Cleveland Railway for the year 1923 under the service-at-cost grant exceeded receipts by \$1,147,159, according to the annual report made to the company's stockholders by John J. Stanley, president.

The company's gross income during 1923 was \$16,494,312 as compared with \$17,082,393 in 1922. This decrease was due to the fact that the rate of fare charged during the year was, for the most part, 5 cents cash, eleven tickets for 50 cents. Since Dec. 1, however, the company has been operating at its maximum rate of fare allowed by the franchise, namely 6 cents cash or nine tickets for 50 cents.

The company's passenger income per fare in 1923 was 5.35 cents, as compared with 5.81 cents in 1922 and

FARE FUND DEFICIT \$41,792

The deficit in the interest fund, which is the company's fare barometer, at the beginning of the present year, was \$41,792. This fund originally was established at \$500,000 and the rate of fare cannot be reduced until it tops \$700,000 again.

The company operated 38,282,973 car miles during 1923 and its total riders numbered 417,405,905 as compared with 402,262,233 in the year previous.

During 1923 the company paid out \$4,610,536 in wages to its conductors, motormen and trainmen and \$1,582,596 for injuries and damages. Its tax bill amounted to \$1,082,195 while its stock and bondholders received \$2,018,411.

In his report to the stockholders Mr. Stanley pointed out that the sort of service rendered by the company was entirely up to the City Council and that its financing for new additions was also a problem for the city to work out. He pointed out likewise that if the city wishes to purchase the lines it could do so by paying \$110 a share.

Such capital as the company expended in the year, with but one exception, came from the sale or retirement of property, and such extensions and betterments as are listed are, of course, but a change in the item or character of the property. The exception was the construction of the East Seventy-ninth Street line. The cost of this work was financed by the owners of the abutting property or by concerns directly benefited by the extension of the service, who subscribed and paid for \$100,000 of the railway stock. In this connection Mr. Stanley said:

This was the only stock which the company sold during 1923. The range of prices in the local market was not as extensive in 1923 as in the previous year, the stock not once touching par, nor did it drop below 87½. As I have previously said to you, the range of prices for the last four years,

while indicating perhaps some tendency toward reaching a figure at which we can hope to finance extensions and betterments, is still pointing to the futility of doing so in the immediate future. So that the form of financing followed the last few years, namely, taking the value of property the city has authorized us to retire and with it paying for other property, the purchase of which the city approves, will continue to go on indefinitely. I have already said that this does not injure either the security of your investment or impair our ability to earn the return on your stock. Because of the limited amount of capital that can be thus used, it does restrict development of the property, making for change without expansion.

This, more than at any time in the last ten years, depends very largely on our partner, the city. Twelve years ago the city by its daily interest and co-operation in our operations created "the best transportation at cost" (and that cost exceptionally low) to be found anywhere in this country. Its attitude on growth and development of the system was likewise most helpful. Should this administration take up anew its responsibilities and carry out its obligations to us and to the public, we will be enabled properly to serve the communities which are Greater Cleveland and to extend and improve our facilities for the making of a Greater Cleveland.

We are committed to the building of a few track extensions and to the completion of the power stations now under way. We should have more cars, at least four new operating stations and, when the city shall have built elevateds or subways, the equipment with which to operate them. But service and growth rest, for the immediate future, with the city rather than with us. The maintenance and operation of the property will continue to be as efficient as we can make them. That we owe both to you and the city.

New Interests Will Continue Massachusetts Lines

A new street railway is being organized in Massachusetts. Charles Melhado and associates have formed the Gardner-Templeton Street Railway, and have purchased at a receiver's sale a part of the Northern Massachusetts Street Railway. To finance the deal they have petitioned the Massachusetts Department of Public Utilities for authority to issue \$90,000 of stock. This petition was granted on Jan. 29, after the department had made an appraisal of the physical property, as is required under Massachusetts laws. The property was found to be worth \$143,871. The new company will operate that section of the defunct railway which extends from Greenwood's shop in South Gardner to Riley's switch in Templeton.

Voters of Athol, Mass., on Feb. 4 ratified the plan for municipal purchase of the Athol & Orange section of the Northern Massachusetts Street Railway. Action on a bond issue for the purchase will be taken at the annual appropriation meeting on Feb. 21. The section of road is 6.76 miles long. Approval of the sale of a parcel of the railway with equipment for \$18,484 to the town of Athol was given recently by Justice Braley of the Massachusetts Supreme Court; also of 500 tons of rails to Henry Lewis & Company, Philadelphia, for \$10,000, and 110,000 lb. of copper wire to the Snyder Corporation, Rochester, N. Y., for \$30,000.

Pittsburgh Goes Ahead

Owners Preparing to Carry Out Rehabilitation Now that Receivers Have Been Discharged

The property of the Pittsburgh Railway has been returned to its owners. This was done on Feb. 1 under court degree, referred to previously in the *ELECTRIC RAILWAY JOURNAL*. The court, however, retains certain technical jurisdiction. The degree of this jurisdiction is specified by it in its formal order. Perhaps the most important thing still to be done by the receivers is to file their final report. This they are directed by the court to do before April 1. The account which the receivers are to file will show all their receipts and disbursements from their last accounting, together with a schedule of all claims, debts and liabilities.

The new agreement with the city under which the company will operate will run for ten years. It was drawn up in the fall of 1921 after prolonged negotiations and has only been awaiting the lifting of the receivership to be put into effect. The terms of the measure were reviewed at length in *ELECTRIC RAILWAY JOURNAL* for Nov. 26, 1921, page 967. Naturally they have come in for comment recently principally by the Mayor in a most favorable light in a formal statement which he made and in a speech by him before members of the local Chamber of Commerce.

Briefly the capitalization of the company will be reduced from about \$156,000,000 to \$62,500,000. On this sum the annual return permitted to be earned by the company has been fixed at \$3,750,000. A board of control will have a voice in the affairs of the company. Two members of this board will be appointed by the city of Pittsburgh, one by the other municipalities to the agreement and one by the company. Five million dollars is to be spent for rehabilitation. A fixed payment is to be made by the company in place of tolls, taxes and other charges. The claims of the city against the company are settled for \$526,091. Fares are to be reduced if there is a surplus from operation and increased if there is a deficit. In other words, there is to be a start anew under modified service at cost.

Declaration of Brooklyn City Stock Dividend Approved

At a special meeting of the stockholders of the Brooklyn City Railroad on Feb. 6 the proposal was approved to increase the capital stock from 1,200,000 shares of \$10 par value to 1,600,000. Application will be made to the Transit Commission for authority to issue the additional capital stock as a 33½ per cent stock dividend. A quarterly dividend of 25 cents a share was declared on the capital stock, payable March 1, 1924, to stockholders of record Feb. 15, 1924.

As explained in the *ELECTRIC RAILWAY JOURNAL* for Feb. 2 after the Brooklyn City Railroad, formerly leased to the Brooklyn Heights Railroad, was returned to its owners dividends were

withheld and capital expenditures in excess of \$4,000,000 were made out of earnings. It is now proposed to issue the stock against these expenditures.

Sale of Chicago & Oak Park Line Confirmed

Sale of the Chicago & Oak Park Elevated Railway to the new Chicago Rapid Transit Company, which is a consolidation of Chicago's four elevated lines, has been approved by the United States District Court.

The Chicago & Oak Park has been in receivership for several years, and the other three lines, the Northwestern, Metropolitan and South Side, had arranged to consolidate some time ago.

The organization of the Chicago Rapid Transit Company was referred to at length in the *ELECTRIC RAILWAY JOURNAL* for Jan. 26, page 156.

Long Island Traction Company Abandons Service

In accordance with an order of Gen. Lincoln C. Andrews, confirmed by the courts, service on the New York & Long Island Traction Company from the Brooklyn city line at Grant Avenue to Lynbrook, L. I., was suspended on Feb. 5. Borough President Connelly of Queens has asked Grover A. Whalen, Commissioner of Plant and Structures, to institute bus service in Queens to relieve the situation. Gen. Andrews in referring to the abandonment said that the matter had been considered from every angle and that the operation of the line was impracticable and impossible under existing conditions. He said that the company would build up the other lines where the patronage was of assistance to it. A committee from the South Ozone Park Civic Club has gone before the Public Service Commission asking for relief. This section was the principal sufferer from the shutdown.

North Carolina Public Service Sold to Holding Company

W. S. Barstow & Company, New York, announce the purchase of the North Carolina Public Service Company by the General Gas & Electric Corporation. Charles B. Hole, his brothers and associates in the North Carolina company retain a substantial interest, but the company will be under the same policy and management as all other properties of the General Gas & Electric Company, the president of which is W. S. Barstow.

The North Carolina Public Service Company was incorporated in 1909 under the laws of North Carolina with a perpetual charter. It owns and operates the electric light and power, gas and electric railway properties in Greensboro and suburbs, the electric light and power, gas and electric railway business serving Salisbury, Spencer and East Spencer and the electric railway business at Concord.

Additional 8 per cent preferred stock of the General Gas & Electric Corporation is being offered at \$101.50 per share to finance the purchase.

Issue of \$7,000,000 of Common Stock Authorized

By the vote of three to two, the Commission Council of New Orleans, La., has approved the ordinance authorizing the New Orleans Public Service, Inc., to issue \$7,500,000 in common stock to be sold at par and to pay dividends not to exceed 9 per cent.

The ordinance carries with it the authorization also to pay a dividend of 9 per cent on the old common stock, amounting to more than \$8,000,000, which formerly could pay legally only 8 per cent.

A third provision authorizes the corporation to issue preferred stock at par and with the consent of the Commission Council, as the opportunity arises.

Mayor McShane and Commissioner Ray voted against the ordinance and Commissioners Black, Murphy and Maloney for it.

The Electric Bond & Share Company controls the outstanding common stock in the Public Service, Inc., and will purchase, it is expected, the new issue just authorized.

Those who advocated the issuance of common stock in preference to the sale of additional bonds with which to obtain the funds necessary to undertake the improvement and extensions advance the following reasons for opposing a further sale of bonds:

1. That the matter of allowable dividend rate upon the common stock does not affect the agreed allowance to the earnings on the investment as a whole, which remains at 7½ per cent.

2. That it is highly important to the citizenry of New Orleans that the company be placed in a position to make at the earliest possible time the improvements and additions necessary to effect economical and efficient production of its three classes of service.

3. That the handling of the additional finances by means of a stock issue will make unnecessary the taking out of its earnings \$6,187,500 cash in the next twenty-five years and be a more economical method than the issuance of twenty-five year 5 per cent bonds. Bonds will necessitate the amortization and payment of interest and losses due to handling and marketing the bond issue totaling \$17,562,500 dividend as follows: par value of bonds, \$7,500,000; handling charge, estimated at 5 per cent, \$375,000; loss which the company must stand in selling its bonds to meet the market, \$1,312,500; and interest for twenty-five years, \$8,375,000. Under the stock plan, the company in twenty-five years will pay out of its earnings \$11,375,000 as follows: Additional 1 per cent dividend rate on present \$8,000,000 common stock, \$2,000,000; dividend on new \$7,500,000 issue, \$9,375,000. In addition it will benefit and the public will benefit through reduced cost of operation through a new equipment to be installed with the new capital.

Formal New York Railways Reorganization Plan Expected

Plans for reorganizing the New York Railways, which operates surface lines in the Borough of Manhattan, were reported on Feb. 8 to have been agreed to by virtually all parties concerned. The properties have been under control of the court for almost four years. The reorganization will be so arranged that the fixed charge and interest obligations will be scaled down to a point where the likelihood will be forever removed of the company's again entering the bankruptcy

court. Capitalization of the new company will be low enough, in other words, to permit of ample earnings on a 5-cent fare. The \$58,500,000 bond and the \$17,500,000 stock structure of the old company did not permit this. The successor company under the reorganization will be divorced from the Interborough, which formerly owned it. A majority of the new common stock, which will be of nominal amount, will be held by banking interests.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were no sales of electric railway securities this week.

Messrs. Butler and Taylor Elected at Atlanta.—At the annual meeting of the stockholders of the Georgia Railway & Power Company, Atlanta, Ga., on Jan. 29, Frank L. Butler, vice-president and general operating manager, and W. H. Taylor, vice-president and general manager, were elected members of the board of directors.

Hearing in Connection with Move to Lift Receivership.—A hearing was set to be held before the Public Service Commission of New York at Albany, on Feb. 6, on the petition of W. G. Phelps, receiver of the Binghamton Railway, for permission to issue \$700,000 of five-year 6 per cent refunding bonds as one of the steps now under way to transfer the railroad property from the hands of the receiver to the corporation and its stockholders. The application for the extension during the next twelve months of the 6-cent fare agreement between the railway and the city is still pending.

New Director Elected.—C. H. Rembold, business manager of the Cincinnati *Times-Star*, has been elected a director of the Cincinnati Street Railway, to succeed the late Judge Rufus B. Smith.

Ohio River Railway to Be Sold.—The property of the Ohio River Electric Railway & Power Company is to be sold at foreclosure sale at Pomeroy, Ohio, on Feb. 26. It consists of about 18 miles of track, built about twenty years ago, extending from Hobson, Ohio, to a number of towns and villages, together with all rails, poles, wires, cars, etc., used in the operation of the property. Included in the sale is the outstanding common stock of the Pomeroy & Midleport Electric Railway, a subsidiary which supplies electric current for light, heat and power purposes in the village of Pomeroy and territory east of it. The receiver is Harry Hartwell, who, besides his office in Pomeroy, has an office at Room 1034, 120 Broadway, New York. The company has been in the hands of a receiver since 1919.

Net Receipts Lower in Boston.—The trustees of the Boston Elevated Railway have filed with the Massachusetts Legislature a statement for the year ended Dec. 31, 1923, showing receipts exceeded cost of service by \$679,631, compared with \$1,412,189 in 1922. Total receipts were \$34,096,813, against \$32,699,176, while total cost of service was \$33,417,181, compared with \$31,386,987 in 1922. The principal factor contributing to the extra expense during the year was the increase in wages.

Traffic and Transportation

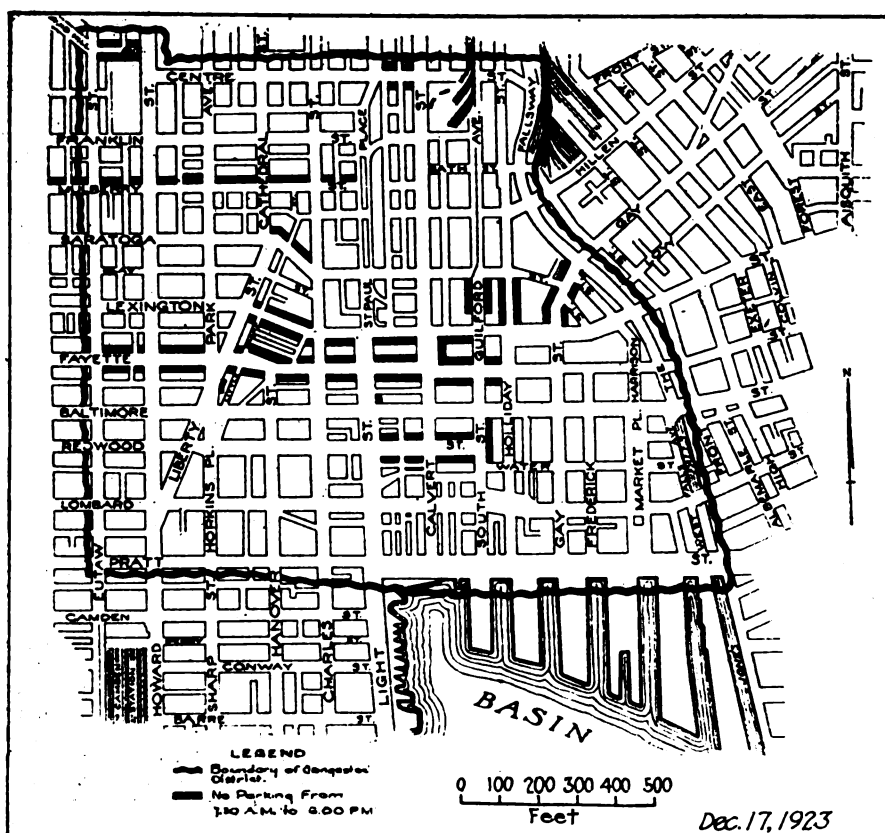
Anti-Parking Regulations Recommended

Rules of Pedestrians and Changes of Car Routes Proposed in the Traffic Report Presented in Baltimore

Street congestion in Baltimore is now as bad and if not worse than before millions of dollars were spent by the city after the great fire in 1904 to widen the streets. This declaration is made in the report of the Mayor's committee appointed to investigate the

other restrictions are recommended, and parking is defined as not including the stopping of commercial vehicles for a sufficient length of time to load or unload and passenger vehicles to take on or let off passengers. Power to formulate and enforce traffic regulation should be lodged in the Police Commissioner, subject to the approval of the Mayor.

Within the congested district pedestrians should cross the street only at street intersections, and in all cases at right angles with the street. Those



The Mayor's Committee in Baltimore Recommends Strict Anti-Parking Regulations Within the Central Business District as Shown on This Map

conditions affecting vehicular traffic in that city. A large part of this congestion is brought about by automobile parking, which at present is stopping the flow of commerce—the "lifeblood" of the city.

In the congested district the committee believes that parking should be prohibited between 7:30 a.m. and 9 p.m. on the important streets indicated in black in the accompanying map, also that there shall be no parking between 7:30 and 9:30 a.m. and between 4:30 and 6:30 p.m. on any double car track street within the congested area shown on the map, or on Cathedral, Liberty and St. Paul Streets. On other streets, in the district, within the rush hours named, thirty-minute parking is to be permitted, and between 9:30 a.m. and 4:30 p.m. two-hour parking. Some

waiting for street cars should remain on the sidewalk until the car is within 200 ft. or less of the stopping point, except where safety zones are established.

The question of street cars in the downtown section was considered, but any idea of their removal "was found to be simply out of the question" because of the dependence on them by the public to reach the business section. A few changes in route were suggested, with the cutting out of some stops on Fayette Street. Other recommendations included a limited amount of street widening, especially at corners, erection of safety aisles, a study of what might be done to reduce the number of steam railroad grade crossings, greater supervision over the licensing of taxicab drivers, etc.

Another Atlanta Hearing

Opposition to Plea of Company for Ten-Cent Fare Shows Itself Vindictive—Railway May Use Buses

Descriptions of the Georgia Railway & Power Company, Atlanta, varying from "an organization of public-spirited men striving unselfishly to serve Atlanta" to "a set of hypocrites who would carry public partnership only for public gain" characterized the fourth public hearing on Jan. 29 on the company's petition to the City Council for permission to apply remedies to overcome the alleged critical financial condition on its railway lines.

Dr. Thornwell Jacobs, president of Oglethorpe University, urged that the petition of the railway be granted. He reviewed the history of public enmity for public service corporations and declared that the public, little by little, had throttled the enterprise which was serving it. He came out flatfooted for the granting of a 10-cent fare so as to permit the company to make a fair return on its investment and in turn give the public better service. Any curtailment of service would injure Atlanta's educational institutions.

Myer Goldberg, Atlanta attorney, voiced opposite sentiments. He charged the company with having ulterior motives, and said that the petition should have been carried direct to the Public Service Commission, which body would decide whether or not the appeal was worth considering.

L. N. Parks, an ex-jitney operator, sprang the surprise of the hearing when he declared in favor of a 10-cent fare and a 2-cent charge for transfers by the railway. Mr. Parks said that he had operated a jitney line for a number of months, charging the regular fare of 10 cents per passenger. Even at this rate, he claimed, jitney operation did not pay.

Chairman Atkinson of the board in a recent public address said the company was ready to start bus operation as soon as the earnings of its railway department were sufficient to enable it to borrow the necessary money. He said that the lines under contemplation would be of two sorts—lines connecting up with car lines in suburbs to which the railway had not yet been extended and bus lines supplementing the regular railway lines where the traffic was too heavy.

The railway is asking 10 cents for single cash fares, tickets to be sold three for 20 cents; a 2-cent transfer charge, and the elimination of jitneys from all streets upon which street cars are operating. Final jurisdiction, however, rests with the state commission.

Bus Companies Also Want to Operate on Concourse

Two bus companies, in addition to the Third Avenue Railway, have applied for franchises to operate buses on the Grand Concourse, New York City, and have submitted offers to the Board of Estimate.

The Audubon Transportation Corporation wants a five-year franchise and proposes to divide the Concourse route into two zones, charging a 5-cent

fare for each, with tickets for school children at twenty tickets for \$1.

The Boulevard Transit Corporation asks for a five-year franchise at a 10-cent fare, and declares that, if granted an exclusive franchise, it will invest from \$600,000 to \$1,000,000 to put in service 150 double-deck buses.

Niles Increases Fare to Ten Cents

The City Council of Niles has passed an ordinance increasing fares on the lines of the West End Traction Company from 5 cents to 10 cents. Retention of car service in Trumbull County seems now assured as the action of the Niles Council has held up settlement of the controversy between the West End Traction Company, a subsidiary of the Pennsylvania-Ohio Electric Company, and the cities of Niles, Girard, Warren and Youngstown. The commission had already granted permission to the company to suspend service. The company's contention was that for the past four years operation had been conducted with an actual loss. When the company threatened suspension the city of Warren authorized the 10-cent fare. Similar action followed later by Girard. The details of the matter have been given previously.

Experimental Service With Hired Buses Proposed for Toledo

Buses rented from private owners are to receive a six-months trial on two routes suggested to the Toledo Council for a crosstown line. In this way the Council hopes to have a referendum of the riders on which route is preferred. Street Railway Commissioner Cann has insisted on the Fearing Street route while the city plan commission has favored the Hawley Street route. The commissioner has received bids and told the Council that it will cost \$310 a day to lease twelve buses for the experiment.

It is hardly probable that the crosstown line will be put into service as soon as Council anticipates because the Community Traction Company has not been consulted as yet. B. C. Adams, president, has informally advised the commissioner that the attitude of the company is unfavorable to the bus experiment until the stabilizing fund had been replenished.

Mr. Cann has estimated that the bus experiment will cost between \$6,000 and \$7,000 a month more than revenues available from the service.

The power problem has become a veritable "Chinese puzzle." The company has filed with the Public Utilities Commission its present rate, which calls for demand charge of \$23,000 a month and 0.9 cent per kilowatt-hour. This amounts to a rate of about 1.6122 cents per kilowatt-hour on the basis of amount of power consumed. The commissioner estimates that the rate should be 1.25 cents, or a saving of about \$10,080 a month on the total power bill. Court action appears likely.

The 8-cent fare with a token rate of four for 30 cents has resulted in an increase of about 10 per cent in revenues, indicating that the riding public has willingly accepted the higher rate.

Hearing Likely on Connecticut Fare Matter

The Public Utilities Commission of Connecticut is expected to meet at Hartford at a date to be announced later for a hearing on the petitions which some of the cities of the State indicate they will file asking relief from the increase in fares on the lines of the Connecticut Company effective Feb. 10.

Chairman Higgins of the commission is reported to have said that since practically every community will be represented it has also been decided that the petition of the Connecticut Company seeking to increase fares in Bridgeport will be indefinitely postponed and will probably be heard at this time.

It is understood that it is the intention of the commission to take one petition and make a test case, but each city's plea will be heard separately.

The company is seeking to restore the rate of three tickets for 25 cents formerly in effect for the present rate of two tickets for 15 cents.

Ticket Fare Rate Increased in Grand Rapids

Ticket fares on the Grand Rapids Railway, Grand Rapids, Mich., were advanced on Feb. 1. Passengers had been paying 50 cents for seven tickets, but now pay 50 cents for six tickets. Cash fares remain at 10 cents. The increase in fare is made under the new service-at-cost franchise which provides that when the equalization account shows a debit of \$50,000 the fare shall increase one step. At any time the account shows a credit of \$50,000 the fare automatically will decrease a point.

Whenever the fare increases under the franchise the rate of return allowed the company decreases. The rate allowed under the former fare was 8 per cent on the valuation. With the increase in fare the rate allowed is a fraction more than 7 per cent.

Final Action Expected on Feb. 14 on Philadelphia Bus Proposal

That no charge should be made the Philadelphia Rural Transit Company, bus operating subsidiary of the Philadelphia Rapid Transit Company, for the use of the city's streets by its buses is the opinion of Mayor Kendrick of Philadelphia. This statement was made by him in answer to criticism leveled at the proposed ordinances now under consideration by the City Council granting free franchises to the company for five bus routes in the northeastern district of the city.

The ordinances were approved by the Council committee on transportation and public utilities on Feb. 5 after a stormy three-hour debate. The Council cannot act on the proposals until its regular meeting on Feb. 14. Three amendments were approved by the committee. One of these reserves to the city the right to grant bus franchises to other companies. The second provides that the city has the right to run its own bus lines if desirable later on, and a third provides for payment by

the bus company of \$250 a year for each bus operated after 1930 and makes possible cancellation of the franchise in 1937.

Express Bus Service Started.—The Public Service Railway started the operation of express automobile coach service on its Fairview line in Camden, N. J., on Jan. 29.

Buses Will Replace Cars.—The City Commission of Astoria, Ore., has authorized its city manager to advertise for bids for a franchise to operate buses in Astoria, to replace the railway service of the Pacific Power & Light Company, which has surrendered its franchise.

Will Oppose Barring Order.—The Motor Bus Owners' Association of Springfield, Mass., facing the prospect of its members being barred from operating in the city after May 1 through the Mayor's refusal to approve a renewal of licenses for any applicant except the Springfield Street Railway, recently sent letters to various manufacturing concerns of the city urging them to support the bus operators in their appeal for a reversal of this policy. The bus owners contend that the Mayor would exceed his rightful authority in arbitrarily barring all independent buses.

Wants to Charge Five Cents.—The Glendale & Montrose Railway has filed an application with the California Railroad Commission for authority to cancel the commutation fare between Glendale and Eagle Rock, Los Angeles County, amounting to 3½ cents a ride. The company wants to charge the regular fare of 5 cents a ride.

New Rates Announced.—The ticket rate on the lines of the Hutchinson Interurban Railway, Hutchinson, Kan., is two for 15 cents and seven for 50 cents in accordance with the recent approval of the Public Utilities Commission. As was announced in the *ELECTRIC RAILWAY JOURNAL*, issue of Feb. 2, the new rate is 8 cents for a single ride instead of the old 6-cent charge, which was blamed by the company for the heavy loss in 1923. The company had asked for a 10-cent fare, but Emerson Carey, president of the company, accepted the suggestion of Judge Reed of the commission, who, with Jesse Greenfield, heard the case.

Traffic Regulations in Force.—The new traffic regulations affecting Chestnut and Walnut Streets, Philadelphia, were recently adopted by the drivers of vehicular traffic. The new regulations restrict motor and horse drawn vehicles to the left-hand side of the two streets, with no parking permitted on either side of the street within the zone. Conductors of the Philadelphia Rapid Transit Company said that for the first time in many months they had been able to keep up to their schedules as a result of the new regulations. President Dunbar of the Philadelphia Rapid Transit Company told Traffic Director Fritz that he would be more than willing to co-operate with the police in helping to straighten out the congested traffic problem which has confronted the city.

Book Reviews

"Studies in the Economics of Overhead Costs"

By J. Maurice Clark. University of Chicago Press, Chicago, Ill., 1923. 502 pages.

The author describes this book, in the preface, as "a bit of research into the principles of dynamic economics," and he says that its central theme is unused capacity. Electric railway readers know what this means because of the expense to which they have to go in providing cars and distribution and power capacity for use during only a very short time during the day, namely, during the rush hours. They do not always realize that this same condition of peak load and unused capacity occurs with many other lines of business, with variations sometimes daily, sometimes weekly, sometimes seasonal, and sometimes varying according to the prosperity of the country or fashion. In fact, most lines of business have their peak loads, all the way from farming, whose fluctuations are seasonal, to laundries, where the peak load seems to come during the first part of the week. In discussing the relation of overhead costs to production, the volume discusses other factors as well as fluctuations in production, and a special chapter is given to public utilities.

The Construction of Vitrified Brick Pavements

Published by the National Paving Brick Manufacturers' Association, Cleveland, Ohio, January, 1924.

This ninety-two-page volume describes a number of types of brick pavement for highway construction. Recommended specifications and methods of construction are included. One entire chapter is devoted to vitrified brick pavements with street railway tracks.

Standards of the Electric Power Club—Electric Power Apparatus

Fifteenth Edition. Published by the Electric Power Club, Cleveland, Ohio, October, 1923.

This handbook of electric power apparatus standards, now in its fifteenth edition, is issued for the first time separate from the Year Book of the club. It is a reference work of practical information concerning the manufacture, test, and performance of electric power apparatus and control equipment. The book contains standardized practice in the United States, following the standardization rules of the A.I.E.E.

New sections have been added for the standardization effected with electric drills and reamers, electric arc welding machines, storage batteries for mining and industrial locomotives, synchronous motors, abbreviations and symbols for use in wiring diagrams. Definitions relating to power switchboards and oil circuit breakers have

been added, and certain standard transformer ratings have been made preferred ratings.

An Investigation of Powdered Coal as Fuel for Power Plant Boilers

By Henry Kreislinger, John Blizard, C. E. Augustine and B. J. Cross. Bulletin 223 of the Department of the Interior, Bureau of Mines, Washington, 1923. 92 pages, illustrated.

This bulletin gives the results of a series of thirty-six tests made on a 468-hp. Edge Moor boiler fired with pulverized coal at the Oneida Street station of the Milwaukee Electric Railway & Light Company. The bulletin describes the equipment and gives the results that can be obtained with this fuel under a power plant boiler. It also discusses the effects of variables such as type of burner, fineness of coal, moisture, furnace temperature and admission of air. The results of the tests show that an over-all boiler efficiency of 80 to 83 per cent can be obtained.

A Survey of Electric Power and Light Companies of the United States

Published by Bonbright & Company, Inc., New York, 1923.

This survey, which has been compiled by the publishers, presents a series of maps and tables by means of which the electric companies operating in cities and towns of 2,500 population and over are listed. These companies serve practically the entire urban population of the United States. The capitalization and earnings of the larger companies are set forth in tabular form, and an additional series of maps shows all transmission lines in the United States operating at 11,000 volts or over. A few characteristic facts about each state are included in the volume, so that the general type of activity of the inhabitants of the territory may be quickly visualized. The relative sizes of the cities and their rate of growth are also presented to give a rough indication of the trend of power demands.

The United States census of 1920 has been used as the primary source for the list of cities and towns and population statistics. Much of the material has been obtained through the co-operation of the officials of the larger power and light companies, the McGraw-Hill Company publications, and the various statistical agencies.

Jubilee of the Glasgow Tramways, 1872-1922

Published by the City of Glasgow, Scotland, 1923. 107 pages, illustrated.

It is eminently desirable that the Glasgow Corporation should put in permanent form a record of the historical addresses and other features of the jubilee of the Glasgow Tramways, which was celebrated Aug. 19, 1922, when this system completed its first fifty years of public service. The sys-

tem started as a horse line of 2½ miles in length, on which the fare was 2d. When the franchise expired in 1894, there were 32 miles which were taken over by the city and equipped with electricity. There are now 128 miles, including 6½ miles of subway and 21½ miles in Paisley and two other outlying towns, soon to be joined up as part of the Glasgow system. The revenue has increased more than ten times. Besides the interesting matter contained in the text, the book is illustrated with portraits of some of the men who have been prominent in the affairs of the tramways, a view of the jubilee procession led by one of the early horse cars, and other interesting views.

The Regulation and Management of Public Utilities

By Charles Stillman Morgan, Ph.D., Boston and New York: Houghton, Mifflin Co., 1923. 362 pages.

The change which has come over the utility from an independent competitive enterprise to one whose activities are controlled, whose profits are limited, and whose return is guaranteed to some extent by the state, may not always be appreciated by those engaged in utility work, because they have seen the transformation come gradually. Nevertheless, the change is profound in its effects, and the purpose of Dr. Morgan's book is to consider the influence which it has had on utility management.

In his book the author has classified utility managers, for want of better terms, as entrepreneurial and non-entrepreneurial. The former, through extensive ownership of securities in the company, are identified in interest and motives with similar owners of industrial and other business enterprises. The non-entrepreneurial manager may have a small proprietary interest in the undertaking, but is primarily a professional manager chosen by the owners for the attainment of the best results. The latter type of manager is becoming increasingly numerous, and one of the principal problems considered in the book is to determine, with this class of management, and with the conditions and limitations following commission regulation, the means by which efficient management in public utilities may be retained. There are many stimuli to this result, among them professional zeal, opinion of others similarly engaged, etc., and it is interesting to note that the author suggests the possibility of a national prize or number of prizes to those managers who in a given interval, as in a year, make the largest contribution to the science or technique of management in the utility field.

Service-at-cost franchises are also considered as regards their effect on company management, and the different incentives or lack of them in various such franchises are discussed, including the plan of rewarding the management in distinction from the capital in the enterprise for signal efficiency. Much of the discussion in the book relates directly to electric railways, so that the book appeals particularly to electric railway readers.

Personal Items

J. S. Bleecker Leaves Ohio Electric

Joins Management Corporation in Philadelphia—Messrs. Pogue and Zimmermann Advanced

Completion of the separation of the various traction lines in the old Ohio Electric Railway system, which at one time comprised more than 600 miles of track, was announced on Feb. 5, together with numerous changes in the management of the Indianapolis, Columbus & Eastern and Columbus, Newark & Zanesville lines.

The two companies have been operated by one management for the last two years, but under the new arrangement each is resolved into itself with separate management and offices.

John S. Bleecker, who has been general manager for the two concerns, is leaving to become associated with the management department of Day & Zimmermann, public utility operators, with headquarters in Philadelphia.

J. M. Pogue, Springfield, who has been purchasing agent for the joint management, becomes general manager of the Indianapolis, Columbus & Eastern with headquarters at Springfield and R. Z. Zimmermann, who has been local manager at Zanesville for the Columbus, Newark & Zanesville, becomes general manager of that company with headquarters at Zanesville.

The two properties have been operated jointly for the respective bondholders by the Day & Zimmermann organization ever since the old Ohio Electric Railway system, of which they were a part, was thrown into the hands of a receiver and dissolved on order of the federal court.

During the last two years Mr. Bleecker, as general manager of the properties, has devoted his efforts toward re-establishing the lines in the confidence of the public as common carriers. Largely as a result of the efforts of the personnel directed by him it is said that the two companies are now on a better financial basis than at any time in recent years.

Desire of the bondholders to exercise more immediate control over their own properties is given as the reason for the segregation of the lines.

The Indianapolis, Columbus & Eastern extends from Dayton to Columbus via Springfield and the Columbus, Newark & Zanesville line from Columbus to Zanesville via Newark. The Indianapolis, Columbus & Eastern also operates a line between Springfield and Lima.

Toledo & Western Changes Announced

C. A. Brown has assumed the duties of superintendent of the Toledo & Western Railroad, Sylvania, Ohio. Mr. Brown has been for a number of years master mechanic of the Community Traction Company of Toledo. P. W.

Peugeot, formerly superintendent of the Toledo & Western Railroad at Sylvania, has been appointed assistant master mechanic of the Community Traction Company. It is understood that W. A. Smith, formerly assistant master mechanic, has been made master mechanic.

Staff of Chicago Surface Lines Reassigned

Guy A. Richardson has been elected vice-president and general manager of the Chicago Surface Lines. He became identified with that organization a year ago as vice-president in charge of operation.

Frank L. Hupp has been appointed assistant to the president as well as secretary of the Chicago Surface Lines. Mr. Hupp has been associated with President Henry A. Blair for many years. He entered the service of the old Chicago Union Traction Company in 1903 as secretary and later was continued as secretary of the Chicago Railways until 1920, when he was elected secretary of the Chicago Surface Lines.

Joseph V. Sullivan, who has been assistant to the president of the Chicago Surface Lines since 1920, has been appointed assistant to the vice-president and general manager. John E. Wilkie has been given a similar title. Both will assist Mr. Richardson with specially assigned duties.

Halbert O. Crews has been appointed supervisor of publicity of the Chicago Surface Lines. Mr. Crews comes from Springfield, Ill., where he has been engaged in publicity work for a number of years.

William Kiefer Elected President

At the regular stockholders' meeting of the Shamokin & Mount Carmel Transit Company, held on Jan. 21, William Kiefer was made president and general manager of the company. Mr. Kiefer has been associated with the company for the past sixteen years as treasurer. He replaces E. W. Samuel, who resigned on Feb. 1, because of failing health.

D. C. McClure Appointed General Superintendent

D. C. McClure, superintendent of the electrical department of the Public Service Company of Denver, Col., has been named general superintendent of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo. Mr. McClure, a graduate in electrical engineering, Rensselaer Polytechnic Institute, has been connected for many years with the Denver Gas & Electric Company (Public Service Company). He has supervised many big undertakings for the Public Service concern, his ability and untiring zeal winning for him the advancement to his new position.

E. B. Meissner Heads St. Louis Car Company

Executive Long Vice-President of Car Manufacturing Company Is Promoted to Succeed Mr. Beggs

Edwin B. Meissner, vice-president of the St. Louis Car Company, was elected president and general manager of the company on Feb. 2, succeeding John I. Beggs, who at his own request was made chairman of the board. Mr. Beggs stated that the advancement of Mr. Meissner was in recognition of exceptional services rendered in the building up of the business of the St. Louis Car Company during the thirteen years of Mr. Meissner's administration of its affairs. Mr. Meissner went to St. Louis from Milwaukee to become associated with the St. Louis Car Company on Feb. 1, 1911.

STARTED TO WORK AT THIRTEEN

On Jan. 1, 1899, a little more than twenty-five years ago, at the age of thirteen, Mr. Meissner entered the service of John I. Beggs, then president of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., as messenger and office boy at \$8 per month. Prior to that time he attended public school, and one semester of high school, but he had to discontinue studying during the day because of financial reverses occurring at that time to his father. As an auxiliary to his office boy wage income Mr. Meissner had a morning paper route and other minor interests in magazine and similar selling schemes customarily utilized for the earning of so-called pin money for boys.

Soon after entering the employ of Mr. Beggs as office boy in 1899, Mr. Meissner took up a night school course in shorthand, typewriting, bookkeeping and commercial law; that completed, he took a three-year course at night equivalent to university training in electrical engineering, and after that a law school extension course, completing his night studies at the age of about twenty.

TRANSFERRED FROM MILWAUKEE TO ST. LOUIS

He gradually advanced in Mr. Beggs' employ through the accounting department, purchasing department, and finally to the position of chief clerk to the president, which position Mr. Meissner occupied when he was transferred from Milwaukee to St. Louis, still to continue in the service of Mr. Beggs as assistant to the president in the administration of the affairs of the St. Louis Car Company. On Jan. 1, 1916, he was promoted to vice-president of the St. Louis Car Company. As previously stated, Mr. Meissner, now only thirty-nine years of age, has been advanced to the post of president and general manager of the car building company. This company, by the way, is one of the most important manufacturers of rolling stock equipment and appurtenances for both electric and steam railroads in the United States. It is a \$3,000,000 concern with a 60-acre plant on North Broadway in the so-called Baden district.

New Pittsburgh Railways Department Heads

**Careers of Messrs. Fitzgerald, Phillips and Boyce Reviewed Briefly—
On These Men Will Fall Responsibility to Carry Out
Details of Rehabilitation Program**

ANNOUNCEMENT of the appointment of Thomas Fitzgerald, Frank R. Phillips and William H. Boyce to the Pittsburgh Railways now that the receivership has been lifted was made by Arthur W. Thompson, president of the company, on Jan. 31. As noted briefly in the *ELECTRIC RAILWAY JOURNAL* for Feb. 2, page 198, Mr. Fitzgerald is general manager, Mr. Phillips mechanical and electrical engineer and Mr. Boyce commercial manager. All the other officers and employees of the company will continue in the service in their respective capacities subject to the regulations governing the responsibilities of their positions.

Mr. Fitzgerald is familiar with the system in Pittsburgh, having made a survey of the district the last three years as consulting electric railway

until 1902. During the next year he was made general superintendent of the Portsmouth district of the Norfolk, Portsmouth & Newport News Company, in charge of railways and electric lighting in Portsmouth, and Norfolk county ferries, operating between Norfolk, Portsmouth and Berkley, Va. He also was engaged in special work reporting on physical and operating conditions of the Roanoke Railway Company.

From 1903 to 1905, Mr. Fitzgerald served as general manager of the Lexington Railway, Lexington, Ky. In 1908 he transferred his activities to Cincinnati, becoming purchasing agent and assistant to vice-president of the Ohio Traction Company, Cincinnati Traction Company, Cincinnati Car Company, Cincinnati Northern Traction

president of the Pennsylvania Street Railway Association. Before going to Pittsburgh, he was master mechanic of the Cleveland Railway in 1894, after leaving high school in Cleveland. He has served the Pittsburgh Railways in many capacities, becoming superintendent of equipment in 1910 and retaining this position until his appointment by the receivers as general manager.

Mr. Boyce began his street railway experience in February, 1902, as a trainman on the railways of the electric light and street railway company of Terre Haute, Indiana. He later became shopman and interurban car dispatcher and in March, 1903, was transferred to the Dallas Electric Light & Power Company of Dallas, Tex., where he became meter man and superintendent of the meter department and eventually assistant superintendent of the company. In September, 1905, he became superintendent of the Sherman Gas & Electric Company of Sherman, Tex., and went to Pittsburgh in February, 1906, to become division superin-



Thomas Fitzgerald



F. B. Phillips



W. H. Boyce

engineer. It is expected that he will put into effect, as soon as possible, many features which have been discussed by the city and company for the improvement of service.

Mr. Phillips, in charge of mechanical and electrical developments, will follow the expansion of the company facilities, particularly the 300 new cars, the greater facilities needed to house them and many other developments.

Mr. Boyce in his capacity as commercial manager, which corresponds to the sales manager of industrial establishments, will devote his time to the merchandising and transportation, fare systems, quality and quantity of service, public relations and such other duties as may be assigned by the general manager.

Mr. Fitzgerald was born and educated in Baltimore, graduating from Johns Hopkins University with the degree of Bachelor of Arts in 1898, after which he took one year of post-graduate work. The following year he served as inspector of the Third Avenue Railroad, New York, and then accepted the position of superintendent of the Fairmont & Clarksburg Electric Railroad in charge of railway and electric lighting activities, a position he held

Company and the Indiana, Columbus & Eastern Traction Company. He was promoted in 1907 to assistant general manager of the Ohio Traction Company and Cincinnati Traction Company, which post he retained until 1913, when he was made general manager of these two companies. While serving as general manager he was called upon to make a number of reports on the operating and physical condition of the Columbus, Buckeye Lake & Newark Electric Railway, the Columbus, Newark & Zanesville Electric Railway, the Indianapolis & Northwestern Traction Company and the Columbus & Lake Michigan Railroad.

Mr. Fitzgerald's traction activities were interrupted by the war, but following his discharge from the army as lieutenant colonel in 1919, he opened offices in Pittsburgh as consulting electric railway engineer. During the past few years he has made a comprehensive study of the Pittsburgh Railways system and assisted in the plans for the reorganization.

Mr. Phillips is one of the most widely known engineers in the electric railway industry. He has been connected with the Pittsburgh Railways for many years. Last December he was elected

tendent and assistant superintendent of transportation of the Pittsburgh Railways Company. On Aug. 1, 1909, he was made superintendent of the Beaver Valley Traction Company and Pittsburgh & Beaver Street Railway, being elected general manager of those companies April 15, 1920. The work that Mr. Boyce has done along the lines of selling transportation has raised him to be a figure of national prominence along this line, so much so that his services are in almost constant demand among companies other than his own as a transportation consultant.

Wisconsin Promotions Announced

Orman Koenes, for the past four years manager of the Wisconsin Gas & Electric Company at Kenosha, Wis., has been promoted to the position of electrical engineer of the northern division of the company. Here he will be in charge of construction and engineering work of the company in Waukesha, Burlington, and Whitewater as assistant district manager, working under the supervision of George W. Boteler, who was recently promoted from man-

ager at Waukesha to district manager of the above-mentioned divisions.

Mr. Koenes' place in Kenosha will be filled by H. M. Pauley, who for five years has been superintendent of the electric light and power systems at Racine. He will also include in his activities the management of the railway property. Mr. Pauley joined the electric distribution department of the Milwaukee Electric Railway & Light Company of Milwaukee about ten years ago. He went from there to the city of Racine.

Coincident with the announcement of these promotions it is stated that Mr. Pauley's position will be filled by Peter Van Susteren, who has been assistant superintendent of the company's street railway and electric distribution lines in Racine.

Obituary

Granger A. Hollister, president of the Hollister Lumber Company, Ltd., and vice-president of the Rochester Gas & Electric Corporation, died suddenly in Rochester. Mr. Hollister assisted in the formation of practically every traction and lighting corporation in the vicinity of Rochester.

Dorsey Dallas Denton, for twenty-two years a supervisor with the United Railways, St. Louis, died recently. He entered the employ of the St. Louis property in 1896 as a conductor and six years later was promoted to the office of supervisor.

William D. Dwyer, general counsel of the Twin City Rapid Transit Company, Minneapolis, Minn., died Jan. 30 at his St. Paul home. Mr. Dwyer was born sixty-four years ago in Liberty, N. Y. He took degrees at the normal school in Albany and at Cornell University. At the age of twenty-one he was admitted to the bar and became a special county judge. In 1908 Mr. Dwyer became chief counsel for the St. Paul City Railway and in 1917 general counsel for the Twin City Rapid Transit. He had been active in the hearings on the valuation of the Minneapolis company before the Minnesota State Railroad & Warehouse Commission.

James Raymond Hammond, district manager of the division of construction and engineering, Stone & Webster, Inc., with headquarters at Cleveland, Ohio, died recently at Cleveland. Mr. Hammond was forty-seven years of age. He had been connected with Stone & Webster since 1909. A large part of his work was performed in Texas, where he was active in electric railway construction.

George H. Benjamin, for many years trainmaster for the Boston Elevated Railway, died recently. He was born in Wallace, Nova Scotia, in 1861 and went to Boston when a young man. He entered railway service with the old Cambridge Street Railway, driving a horse car between Harvard Square in Cambridge, and Bowdoin Square, Boston. Later he operated one of the first electric cars for the West End Street Railway in Boston.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
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for Discussion of Manufacturing and Sales Matters

Status of Trade Associations

Such Bodies May Lawfully Compile and Publish General Economic Information—Law Interpreted

Trade associations may lawfully collect from individual members statistical data necessary to the compilation of general information, and the latter may be properly and lawfully as well as beneficially published by them. Wilson Compton, secretary and manager of the National Lumber Manufacturers' Association, made this plain in a letter to Stephen B. Davis, solicitor of the Department of Commerce.

This letter constitutes the first public statement on behalf of a national industrial association in interpretation of the requested informal opinion on the subject given to Secretary of Commerce Hoover by Attorney-General Daugherty and recently made public. This opinion has been variously interpreted, owing to apparently conflicting statements contained therein. Mr. Compton holds that the law and the Attorney-General's opinion are:

1. Trade associations may lawfully gather from members individual detailed information on production, orders, shipments, stocks and prices, but this individual detailed information may not be given to the public or distributed to members.

2. General information showing the conditions of an industry and changes in supply of and demand for its products, such as the total production, shipments, stocks on hand and the average price or range of price, etc., may be compiled from the information obtained as above and may be published.

It will be recalled that Mr. Hoover wrote to Mr. Daugherty to ask his opinion as to whether, in view of recent court decisions and decrees, trade associations could collect and publicly disseminate fundamental information in regard to their trades. There has been great diversity of opinion as to the meaning of the reply, some associations even taking the position that it means that the Attorney-General considers it unlawful for trade associations to collect and publish that general information in the absence of which business generally and the economic direction of the country's affairs will necessarily be without intelligent guidance.

Mr. Compton asserts in his letter to the Solicitor of the Department of Commerce that no other conclusion than that stated makes it possible to reconcile the several statements in the Attorney-General's letter. He says:

A natural, and if you please, I might say a common-sense, interpretation of the Attorney-General's letter is that the Attorney-General has plainly, although indirectly said, that the activity in question—the compilation and publication by trade associations, of current trade information—is not *per se* unlawful. For example, the Attorney-General says:

"In my judgment the effect of general information as to the conditions of an industry, such as the total production, shipments, stock on hand, and average price or range of price, is entirely different from

that resulting from each person engaged in an industry receiving directly or through a common medium reports which reveal to him the exact condition of the business of his competitors. When thus informed each one is invited and is naturally inclined to imitate the conduct of his most successful competitor; and the spread of comradeship created by the confidential exchange of information of this character necessarily prevents the free competition between them, which would otherwise prevail."

As Mr. Compton sees it, the Attorney-General draws a sharp distinction between the two sorts of information—first, the general compiled information descriptive of the industry's conditions, and, second, the intimate detail description of the condition of the business of each competitor individually. Mr. Compton points out that it is the latter, namely, the detailed information disclosing the identity of individual competitors and the intimate details of a competitor's business, which the Attorney-General holds cannot legally be distributed, although it may be collected, for he says in his letter to Mr. Hoover:

I see no objection to its being gathered by an association, provided it be strictly guarded and the association prohibited from distributing it among its membership.

New Type Gasoline-Electric Car Sold

The first of a new type gasoline-electric passenger car intended for use in railroad service has been sold to the Chicago Great Western Railroad and will be demonstrated some time in May or June. This car was developed by the co-operation of the General Electric Company with the St. Louis Car Company, the Electromotive Engineering Company of Cleveland and the Winton Engine Company. It will seat fifty-six persons, has 100 sq.ft. of baggage room, is arranged for double-end operation and will be capable of maximum speeds up to 60 m.p.h. The car will weigh, complete, and "ready to roll," approximately 54,000 lb. It will have capacity sufficient to handle a 35-ton trail car behind it.

Metal, Coal and Material Prices

Metals—New York		Feb. 5, 1924
Copper, electrolytic, cents per lb.	12.562	
Copper wire base, cents per lb.	15.25	
Lead, cents per lb.	8.20	
Zinc, cents per lb.	7.00	
Tin, Straits, cents per lb.	51.125	
Bituminous Coal, f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$5.075	
Somersett mine run, Boston, net tons	2.175	
Pittsburgh mine run, Pittsburgh, net tons	2.00	
Franklin, Ill., screenings, Chicago, net tons	1.825	
Central, Ill., screenings, Chicago, net tons	1.35	
Kansas screenings, Kansas City, net tons	2.25	
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$6.60	
Weatherproof wire base, N. Y., cents per lb	17.00	
Cement, Chicago net prices, without bags	\$2.20	
Linseed oil (5-bbl. lots), N. Y., per gal.	\$0.95	
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.74	
Turpentine, (bbl. lots), N. Y., per gal.	\$1.02	

Paving Brick Industry Active

A sharp increase in unfilled orders for vitrified paving brick in December is reported to the United States Department of Commerce by the National Paving Brick Manufacturers' Association.

Unfilled orders in December had jumped to 60,624,000, as against 54,535,000 for November, and this is considered an accurate gage of the demand for early spring and summer shipments. Stock on hand exceeds the total of unfilled orders. It is interesting to note, also, that contractors and engineers are assisting in relieving the seasonal aspect of the paving brick industry by asking for winter deliveries, shipments for December amounting to 12,979,000.

Kansas led in consumption for December, followed closely by Ohio. In the distribution of unfilled orders Oklahoma leads the list, with Ohio, West Virginia, Pennsylvania and Illinois following in order.

Rolling Stock

Dallas Railway expects to receive on March 1 the thirty cars ordered some months ago. The detailed specifications of these cars follow:

Builder of car body	C. C. Kuhlman Car Company
Type of car	Peter Witt
Seating capacity	50
Total weight	34,000 lb.
Booster centers, length	26 ft.
Length over all	45 ft. 8 1/2 in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 5 in.
Body	Semi-steel
Interior trim	Cherry
Roof	Monitor
Air brakes	General Electric
Axles	Brill
Bumpers	Angle iron
Car signal system	Faraday bell signals
Car trimmings	Bronze
Center and side bearings	Brill
Conduits and junction boxes	Duraduct
Control	General Electric-K
Curtain fixtures	Curtain Supply Co. ring fixtures
Curtain material	O'Bannon
Designation signs	Hunter
Door operating mechanism	National Pneumatic
Fare boxes	Johnson
Fenders or wheelguards	H. B. Life Guard
Gears and pinions	General Electric
Hand brakes	Brill
Heater equipment	Consolidated Car Heating
Headlights	Golden Glow
Journal boxes	Brill
Lighting arresters	General Electric
Motors	4-G. E. 265 inside hung
Paint	Enamel
Sanders	Ohio Brass
Sash fixtures	Bronze
Seats	Brill
Seating material	Wood slat
Spring	Brill
Step treads	Feralum
Trolley retrievers	Knutsen
Trolley base	General Electric
Trolley wheels	General Electric
Trucks	Brill-77-E
Ventilators	Railway Utility Company
Wheels	Rolled Steel 26 in.
Special devices, etc.	National Pneumatic interlocking door control with conductor-motorman signals.

Birmingham Railway, Light & Power Company, Birmingham, Ala., through its superintendent, is rushing delivery on twenty new cars which are expected to reach Birmingham about March 1.

Warren Street Railway, Warren, Pa., has purchased two new cars.

Cleveland Railway in 1923 added sixty-four cars to its equipment.

Wheeling Traction Company, Wheeling, W. Va., ordered in 1923 two interurban two-man cars from the Cincinnati Car Company. The total weight of the cars was 48,000 lb. and the seating capacity was seventy-two.

Track and Line

Cleveland Railway during 1923 renewed 11.67 miles of single track and built 6.13 miles of extensions.

Wisconsin Public Service Corporation, Green Bay, Wis., will spend approximately \$3,000,000 during 1924 in carrying out its improvement program, which includes extensions and additions.

Southern Pacific Company, San Francisco, has been granted permission by the California Railroad Commission to construct spur tracks in the cities of San Francisco, El Centro and Oakland.

Pacific Electric Railway, Los Angeles, Cal., has applied to the commission for authority to reconstruct the grade crossing of its track between Twenty-seventh Street and a point easterly of Nineteenth Street in the city of Newport Beach.

Manchester Street Railway, Manchester, N. H., during 1923 rebuilt 1 mile of city track.

United Railways, St. Louis, built 3.17 miles of city track paved with granite in 1923 and rebuilt 21.72 miles.

Power Houses, Shops and Buildings

Columbus Railway, Power & Light Company, Columbus, Ohio, is planning to erect a new 150,000-kw. station laid out for five 30,000-kw. turbine-generator sets, two of which have been ordered from the General Electric Company.

Pittsburg County Railway, McAlester, Okla., will build a new power station at McAlester to cost \$450,000. The power station will be built by the Choctaw Power & Light Company and the Pittsburg County Railway jointly, as both are owned by the same parent company. A new terminal station and office building are also to be built during the year by the interurban company.

New York, New Haven & Hartford Railroad has awarded the contract to the Anchor Construction Company for the erection of a new steel building, 24 ft. x 26 ft. on Spring Street, New Haven.

Trade Notes

Ingot Iron Railway Products Company, Chicago, has been organized for the development and promotion of sales of Armco corrugated metal culverts in the railway field. The central office is located at 1318 Peoples Gas Building, Chicago.

Stevens & Wood, Inc., New York, N. Y., announces that John W. F. Bennett, recently chief construction engineer of the American Sugar Refining Company, has become associated with them, in their work of engineering, financing, construction and management, as vice-president and contract manager effective Feb. 1.

Okonite Company, Passaic, N. J., has recently opened a branch office at Pitts-

burgh, Pa. It is located at 1111 First National Bank Building. It will be in charge of Edward A. Damrau, district manager.

Western Electric Company, New York, N. Y., has moved its supply department office in Minneapolis to 413-417 South Fourth Street.

Scott-Jaqua Company, Inc., Indianapolis, has opened offices in the Roosevelt Building as electric sales representative and engineer. The purpose is to better serve the electric field in construction and illuminating material and equipment from Indianapolis as the distributing center. The principals in the company are John F. Scott and Charles A. Jaqua, both of whom have been identified with the electrical industry in India in various capacities for several years. In addition to the merchandising activities of the business the company offers a high grade engineering service to its clientele to assist in proper and economical application of the equipment and construction material. The manufacturers of which the company is a direct representative include the American Steel & Wire Company, the Frank Adam Electric Company, the Kuhlman Electric Company and other prominent manufacturers.

Ohio Brass Company, Mansfield, Ohio, has purchased about 5 acres of land with buildings just across the Pennsylvania Railroad tracks from its present Mansfield, Ohio, plant. The tract is bounded by three trunk-line railroads—the Pennsylvania, Erie and Baltimore & Ohio. The purchase was made from the Aultman-Taylor Machinery Company.

American Bosch Magneto Corporation, Springfield, Mass., has obtained a final injunction from the state and federal courts against the Bosch Ignition Corporation, Chicago, permanently restraining it from using the name "Bosch." According to the announcement of the Springfield company the sale by agents of the Bosch Ignition Corporation of transformers which they may have in stock is in direct violation of the injunction orders.

C. Garness, formerly with the American Car & Foundry Company, has been appointed supervising engineer of railway car inspection by the Robert W. Hunt Company. Mr. Garness was graduated as a mechanical engineer in the Technical School of Bergen, Norway, and after being associated with the Westinghouse Electric & Manufacturing Company and the Carnegie Steel Company entered the engineering department of the Standard Steel Car Company, at Butler, Pa., where he remained four years. For the past twelve years Mr. Garness has been associated with the American Car & Foundry Company, first in its general office at St. Louis and also at its Detroit shops, during 1917 and 1918. Since that time he has been engaged as mechanical engineer of the American Car & Foundry Company shops at Chicago.

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has tentative plans under advisement for extensions of its plant at Sharon, Pa., used for the production of transformers. It is said that the present output of distribution transformers will be doubled.

One of the "Daily Dozen"—



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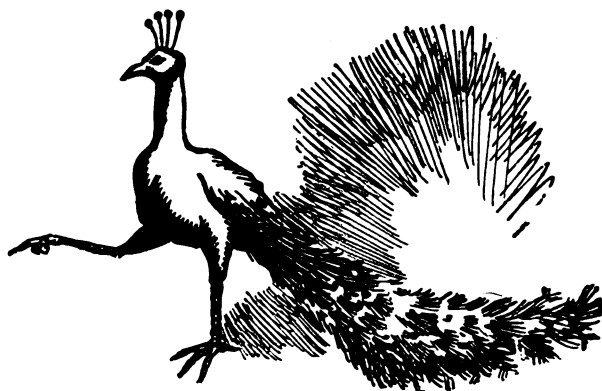
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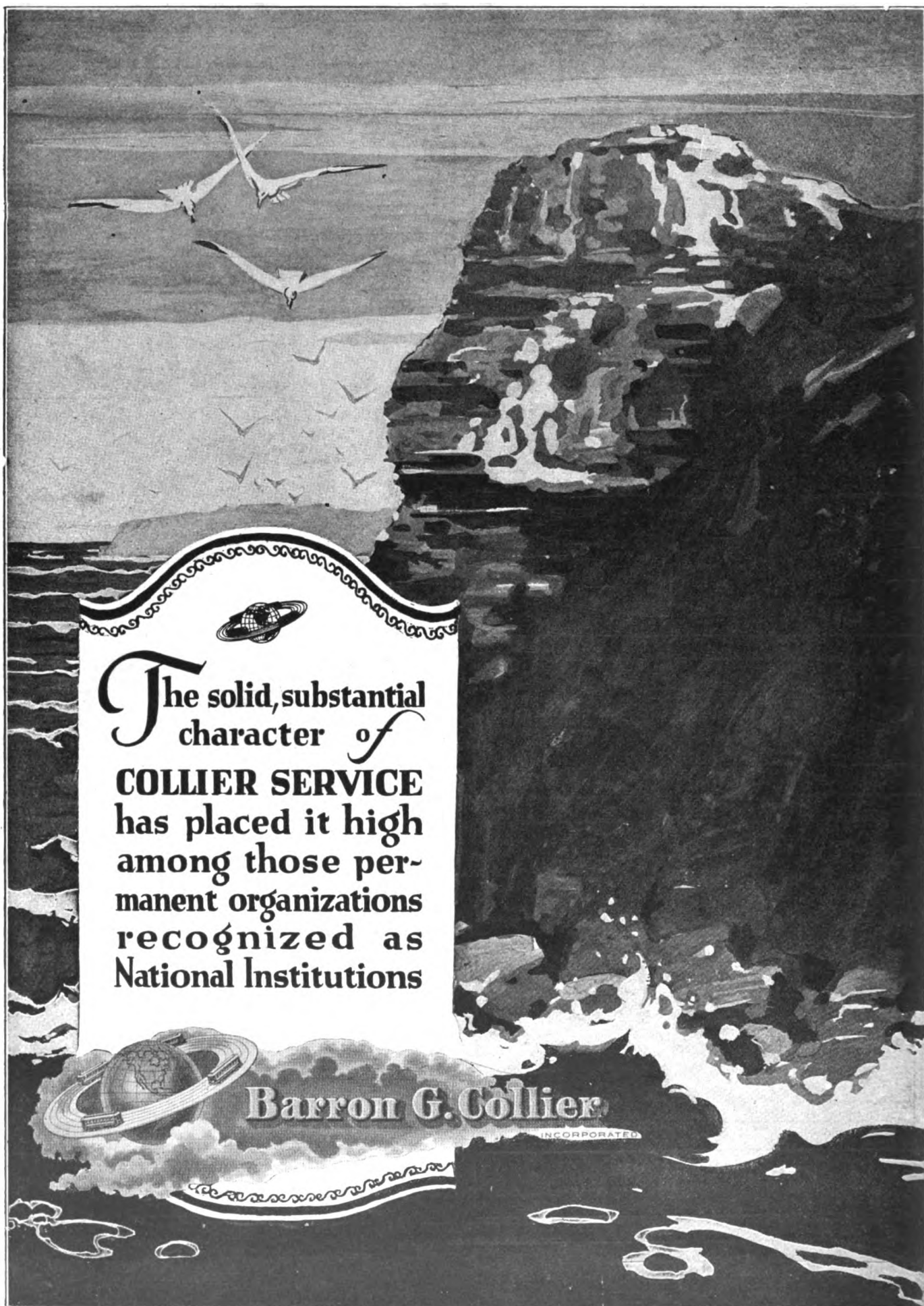
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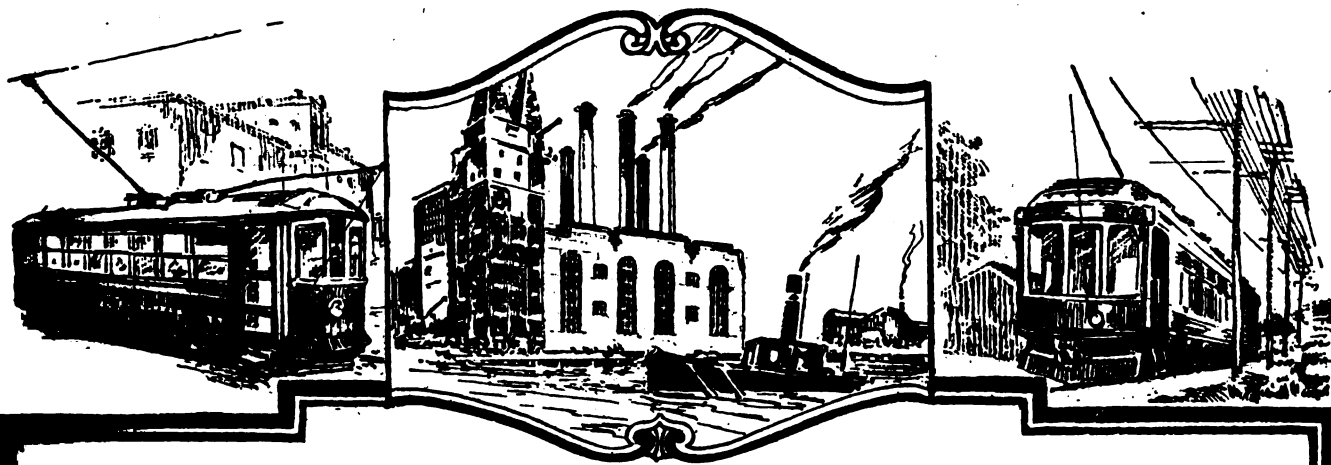
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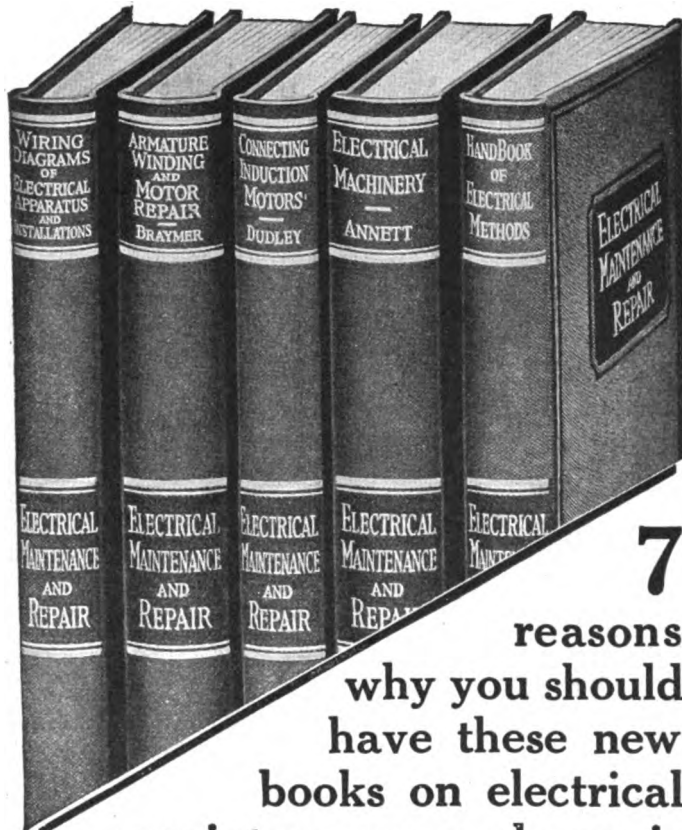
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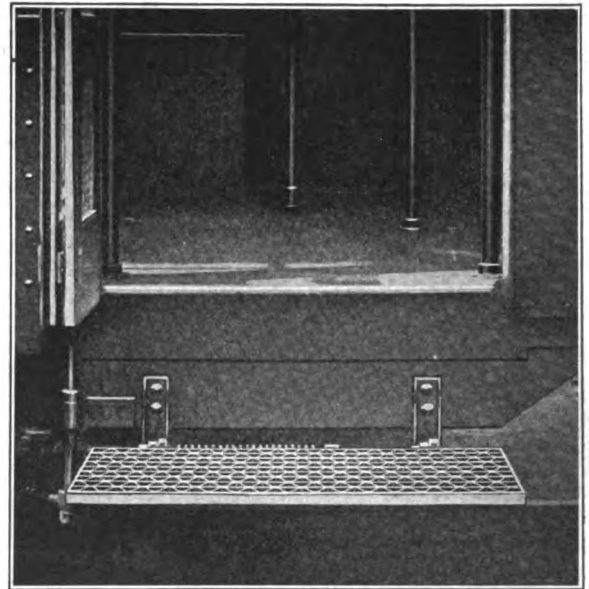
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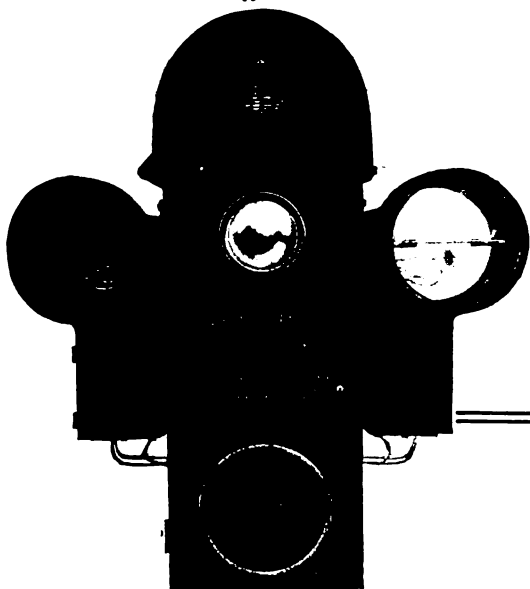
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10	TO ARLINGTON	FOR	21	MAR. 002800					22
11	CLAR HILL C. N.	372	23						
12	TO BOY ST.		24						
13	IN PROSPECT		25						
14	OUT BEACON		26						
15	SPRINGFIELD		27						
16	WESTER		28						
17	IN HUMAN SQ.		29						
18	PROSPECT		30						
19	MANHATTAN ST.		31						
20	TO HARVARD			GOOD ONLY UNTIL 2 AM SEE OTHER SIDE FOR CONDITIONS OF USE OF THIS TRANSFER TICKET					
6 AM									
7 AM									
SEE OTHER SIDE FOR CONDITIONS OF USE OF THIS TRANSFER TICKET									
8 AM									
9 AM									
10 AM									
SEE OTHER SIDE FOR CONDITIONS OF USE OF THIS TRANSFER TICKET									
11 AM									
12 NOON									

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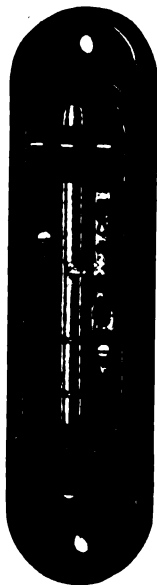
116 N. 12th Street, Philadelphia, Pa.

Los Angeles

New York

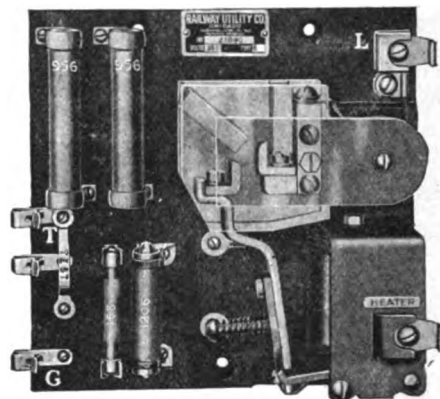
San Francisco

Utility New Type No. 8 Heat Regulator— The Last Word in Thermostatic Control of Electric Heaters



The new method of mounting our Thermostats renders them absolutely shock and tamper-proof. Using a soft rubber bushing at the top of the mercury tube and holding the bushing in a loose-fitting clamp give it the flexibility necessary to prevent the separation of the mercury column ordinarily occasioned by vibration of the car or shock through tampering by the crews. We have also added a spring contact "S C" and a permanent contact "P," as shown in illustration. Should the mercury tube be broken from shock or vibration, the spring contact "S C" will engage permanent contact "P," thereby closing an electric circuit that cuts off the heat.

IN THE NEW NO. 8 SWITCH, shown in illustration at right, we have eliminated the use of a Relay and have substituted an Eliminator, which takes the place of the Relay, so that the only movable part in the whole equipment is the main contactor, which cuts the heat in and out. We have also designed an Applicator, to take the place of Relays on any switches heretofore furnished by us, with complete instructions for making the change.



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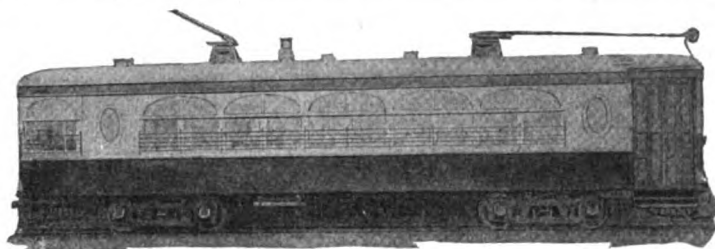
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Paving Brick Industry Active

A sharp increase in unfilled orders for vitrified paving brick in December is reported to the United States Department of Commerce by the National Paving Brick Manufacturers' Association.

Unfilled orders in December had jumped to 60,624,000, as against 54,535,000 for November, and this is considered an accurate gage of the demand for early spring and summer shipments. Stock on hand exceeds the total of unfilled orders. It is interesting to note, also, that contractors and engineers are assisting in relieving the seasonal aspect of the paving brick industry by asking for winter deliveries, shipments for December amounting to 12,979,000.

Kansas led in consumption for December, followed closely by Ohio. In the distribution of unfilled orders Oklahoma leads the list, with Ohio, West Virginia, Pennsylvania and Illinois following in order.

Rolling Stock

Dallas Railway expects to receive on March 1 the thirty cars ordered some months ago. The detailed specifications of these cars follow:

Builder of car body	C. C. Kuhlman Car Company
Type of car	Peter Witt
Seating capacity	50
Total weight	34,000 lb.
Boiler centers, length	26 ft.
Length over all	45 ft. 81 in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 5 in.
Body	Semi-steel
Interior trim	Cherry
Roof	Monitor
Air brakes	General Electric
Axles	Brill
Bumpers	Angle iron
Car signal system	Faraday bell signals
Car trimmings	Bronze
Center and side bearings	Brill
Conduits and junction boxes	Duraduct
Control	General Electric-K
Curtain fixtures	Curtain Supply Co. ring fixtures
Curtain material	O'Bannon
Designation signs	Hunter
Door operating mechanism	National Pneumatic
Fare boxes	Johnson
Fenders or wheelguards	H. B. Life Guard
Gears and pinions	General Electric
Hand brakes	Brill
Heater equipment	Consolidated Car Heating
Headlights	Golden Glow
Journal boxes	Brill
Lighting arresters	General Electric
Motors	4-G. E. 265 inside hung
Paint	Enamel
Sanders	Ohio Brass
Seat fixtures	Bronze
Seats	Brill
Seating material	Wood slat
Spring	Brill
Step treads	Feralum
Trolley retrievers	Knutsen
Trolley base	General Electric
Trolley wheels	General Electric
Trucks	Brill-77-E
Ventilators	Railway Utility Company
Wheels	Rolled Steel 26 in.
Special devices, etc.	National Pneumatic interlocking door control with conductor-motorman signals.

Birmingham Railway, Light & Power Company, Birmingham, Ala., through its superintendent, is rushing delivery on twenty new cars which are expected to reach Birmingham about March 1.

Warren Street Railway, Warren, Pa., has purchased two new cars.

Cleveland Railway in 1923 added sixty-four cars to its equipment.

Wheeling Traction Company, Wheeling, W. Va., ordered in 1923 two interurban two-man cars from the Cincinnati Car Company. The total weight of the cars was 48,000 lb. and the seating capacity was seventy-two.

Track and Line

Cleveland Railway during 1923 renewed 11.67 miles of single track and built 6.13 miles of extensions.

Wisconsin Public Service Corporation, Green Bay, Wis., will spend approximately \$3,000,000 during 1924 in carrying out its improvement program, which includes extensions and additions.

Southern Pacific Company, San Francisco, has been granted permission by the California Railroad Commission to construct spur tracks in the cities of San Francisco, El Centro and Oakland.

Pacific Electric Railway, Los Angeles, Cal., has applied to the commission for authority to reconstruct the grade crossing of its track between Twenty-seventh Street and a point easterly of Nineteenth Street in the city of Newport Beach.

Manchester Street Railway, Manchester, N. H., during 1923 rebuilt 1 mile of city track.

United Railways, St. Louis, built 3.17 miles of city track paved with granite in 1923 and rebuilt 21.72 miles.

Power Houses, Shops and Buildings

Columbus Railway, Power & Light Company, Columbus, Ohio, is planning to erect a new 150,000-kw. station laid out for five 30,000-kw. turbine-generator sets, two of which have been ordered from the General Electric Company.

Pittsburg County Railway, McAlester, Okla., will build a new power station at McAlester to cost \$450,000. The power station will be built by the Choctaw Power & Light Company and the Pittsburg County Railway jointly, as both are owned by the same parent company. A new terminal station and office building are also to be built during the year by the interurban company.

New York, New Haven & Hartford Railroad has awarded the contract to the Anchor Construction Company for the erection of a new steel building, 24 ft. x 26 ft. on Spring Street, New Haven.

Trade Notes

Ingot Iron Railway Products Company, Chicago, has been organized for the development and promotion of sales of Armco corrugated metal culverts in the railway field. The central office is located at 1318 Peoples Gas Building, Chicago.

Stevens & Wood, Inc., New York, N. Y., announces that John W. F. Bennett, recently chief construction engineer of the American Sugar Refining Company, has become associated with them, in their work of engineering, financing, construction and management, as vice-president and contract manager effective Feb. 1.

Okonite Company, Passaic, N. J., has recently opened a branch office at Pitts-

burgh, Pa. It is located at 1111 First National Bank Building. It will be in charge of Edward A. Damrau, district manager.

Western Electric Company, New York, N. Y., has moved its supply department office in Minneapolis to 413-417 South Fourth Street.

Scott-Jaqua Company, Inc., Indianapolis, has opened offices in the Roosevelt Building as electric sales representative and engineer. The purpose is to better serve the electric field in construction and illuminating material and equipment from Indianapolis as the distributing center. The principals in the company are John F. Scott and Charles A. Jaqua, both of whom have been identified with the electrical industry in India in various capacities for several years. In addition to the merchandising activities of the business the company offers a high grade engineering service to its clientele to assist in proper and economical application of the equipment and construction material. The manufacturers of which the company is a direct representative include the American Steel & Wire Company, the Frank Adam Electric Company, the Kuhlman Electric Company and other prominent manufacturers.

Ohio Brass Company, Mansfield, Ohio, has purchased about 5 acres of land with buildings just across the Pennsylvania Railroad tracks from its present Mansfield, Ohio, plant. The tract is bounded by three trunk-line railroads—the Pennsylvania, Erie and Baltimore & Ohio. The purchase was made from the Aultman-Taylor Machinery Company.

American Bosch Magneto Corporation, Springfield, Mass., has obtained a final injunction from the state and federal courts against the Bosch Ignition Corporation, Chicago, permanently restraining it from using the name "Bosch." According to the announcement of the Springfield company the sale by agents of the Bosch Ignition Corporation of transformers which they may have in stock is in direct violation of the injunction orders.

C. Garness, formerly with the American Car & Foundry Company, has been appointed supervising engineer of railway car inspection by the Robert W. Hunt Company. Mr. Garness was graduated as a mechanical engineer in the Technical School of Bergen, Norway, and after being associated with the Westinghouse Electric & Manufacturing Company and the Carnegie Steel Company entered the engineering department of the Standard Steel Car Company, at Butler, Pa., where he remained four years. For the past twelve years Mr. Garness has been associated with the American Car & Foundry Company, first in its general office at St. Louis and also at its Detroit shops, during 1917 and 1918. Since that time he has been engaged as mechanical engineer of the American Car & Foundry Company shops at Chicago.

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has tentative plans under advisement for extensions of its plant at Sharon, Pa., used for the production of transformers. It is said that the present output of distribution transformers will be doubled.

One of the "Daily Dozen"—



Peacock Staffless Brakes

JUST as physical exercise, regularly indulged in, safeguards the health and strength of the individual, so also will regular hand brake exercise safeguard railway operation.

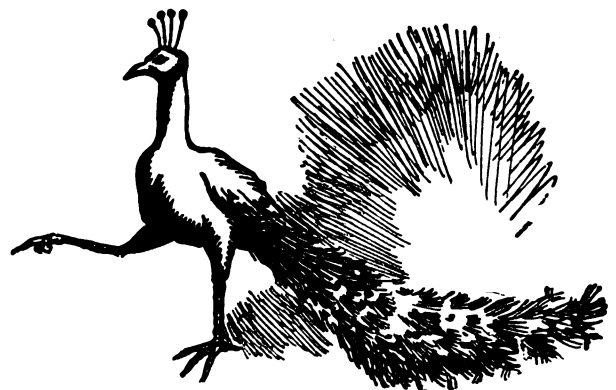
Use the right equipment!

One doesn't expect to get successful results from gymnasium exercises taken with improper or inadequate apparatus. Neither will hand brake practice amount to much unless the equipment is suited to the work.

Peacock Brakes are built by specialists in hand brake problems. Hand brakes and nothing else—that's our business. There is a proper type of Peacock Brake for every size and style of car—a Peacock Brake with which any motorman can stop the car in the minimum possible distance.

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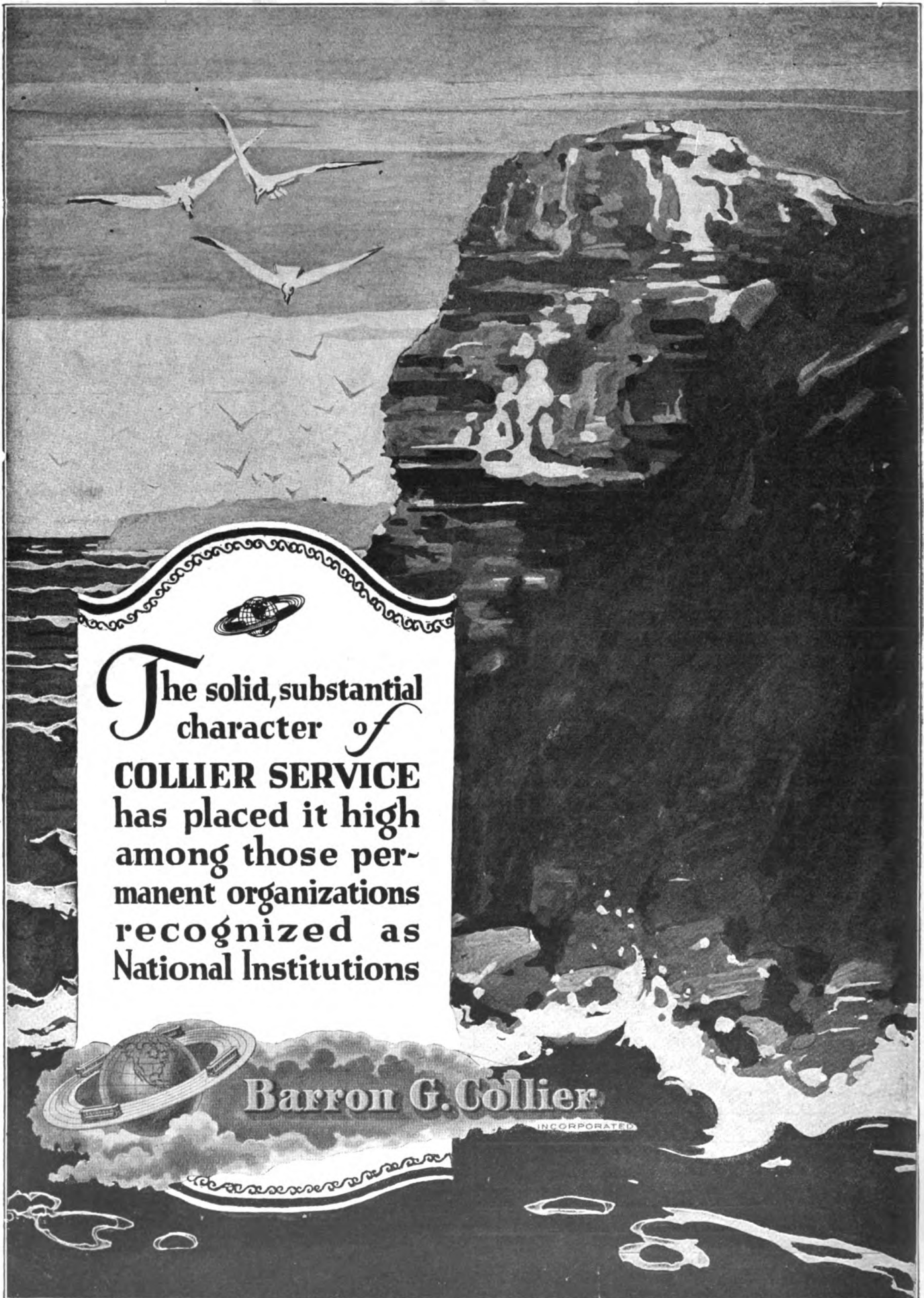
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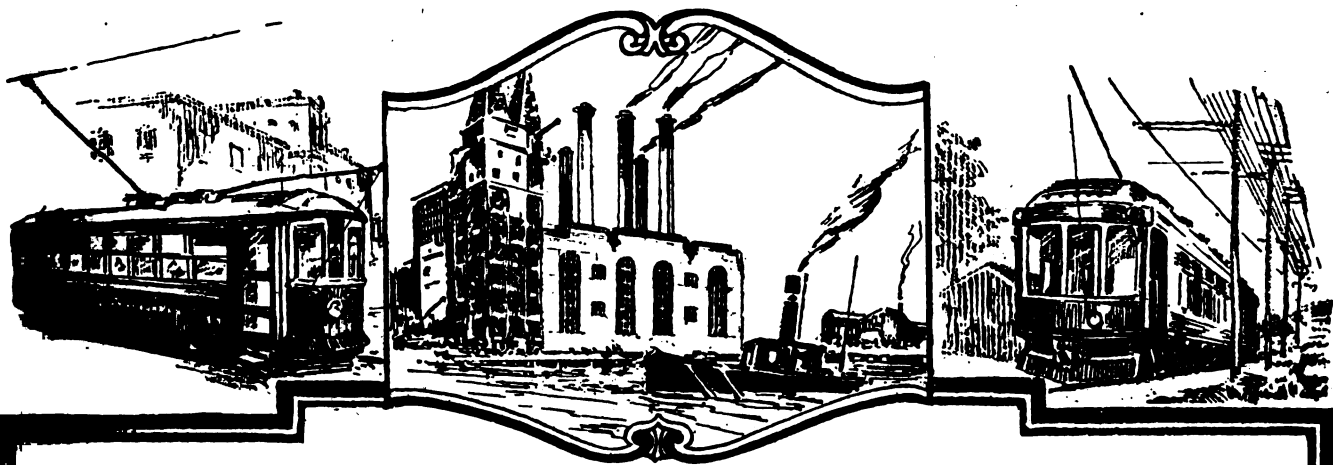
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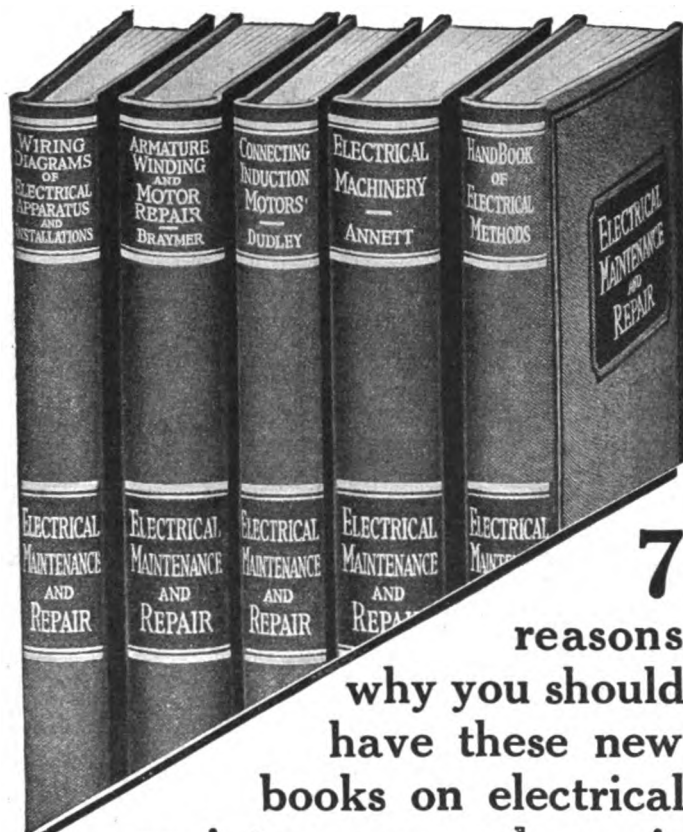
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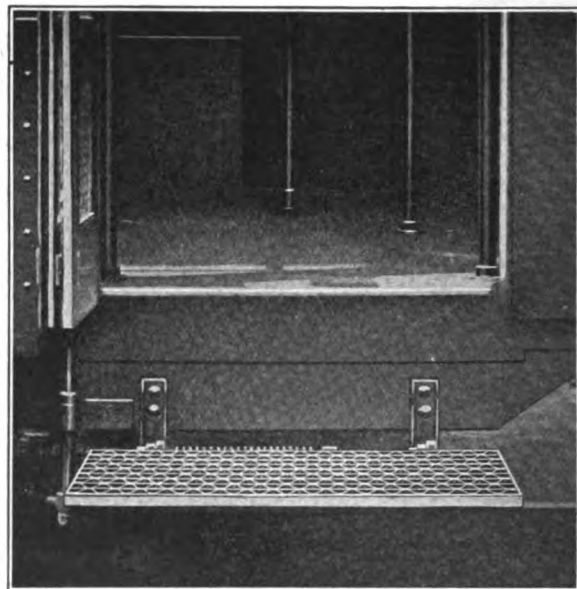
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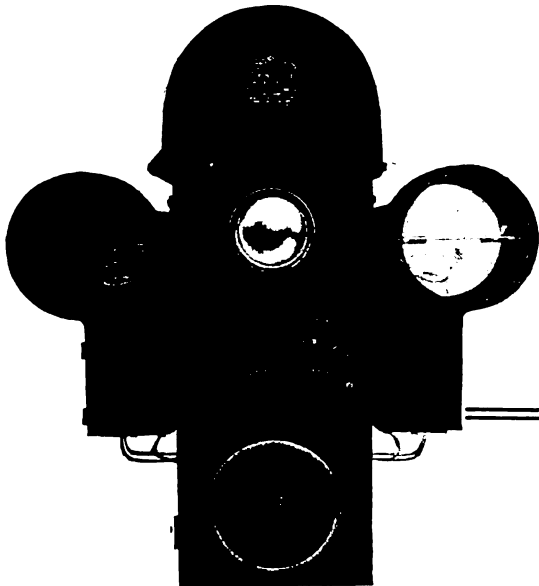
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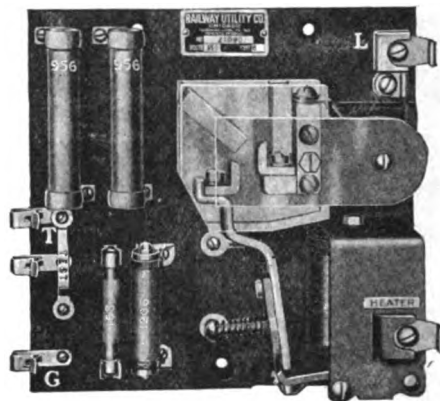
1	2	3	4	5	6	7	8	9
10	TO ARLINGTON	Feb	21					
11	" CLAR HILL C. R.	22						
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15	" SPRINGFIELD "	26						
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18	" PROSPECT and	29						
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20	" CAMBRIDGE ST.	31						
	" TO HAYWARD							
	" STA. OUT							
	" TO DELMONTE							
	" HAYWARD ST.							
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	12 NOON							

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The new method of mounting our Thermostats renders them absolutely shock and tamper-proof. Using a soft rubber bushing at the top of the mercury tube and holding the bushing in a loose-fitting clamp give it the flexibility necessary to prevent the separation of the mercury column ordinarily occasioned by vibration of the car or shock through tampering by the crews. We have also added a spring contact "S C" and a permanent contact "P," as shown in illustration. Should the mercury tube be broken from shock or vibration, the spring contact "S C" will engage permanent contact "P," thereby closing an electric circuit that cuts off the heat.

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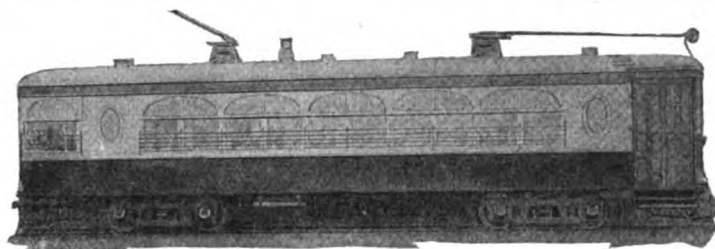
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Strongest
Simplest
Neatest**



*Lightest
Weight
Stationary
Steel Seat*



*Lightest
Weight
Walkover
Steel Seat*

*No higher in price than others
Write for particulars*

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PHILADELPHIA

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Chicago
McCormick Bldg.

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The Baker Wood Preserving Company CREOSOTERS

Washington Court House, Ohio

Cross Ties

Bridge Timbers

Lumber

Posts

Piling

Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

Protect Your Highway Crossings



with Nachod Highway Crossing Signals. They prevent damage suits, and let you sleep easier at night. Furnished with bell, wig wag and flashing lights, independently operated. Also singly, or in any combination.

NACHOD SIGNALS

for highway crossings are described in Catalog 720. They are operated from trolley power by high-speed overhead trolley contractors without moving parts. Our Catalog 719 tells about Nachod Block Signals; and the Manual about the automatic Headway Recorder for timing cars.

NACHOD SIGNAL CO., INC.
LOUISVILLE, KENTUCKY

American Rail Bonds

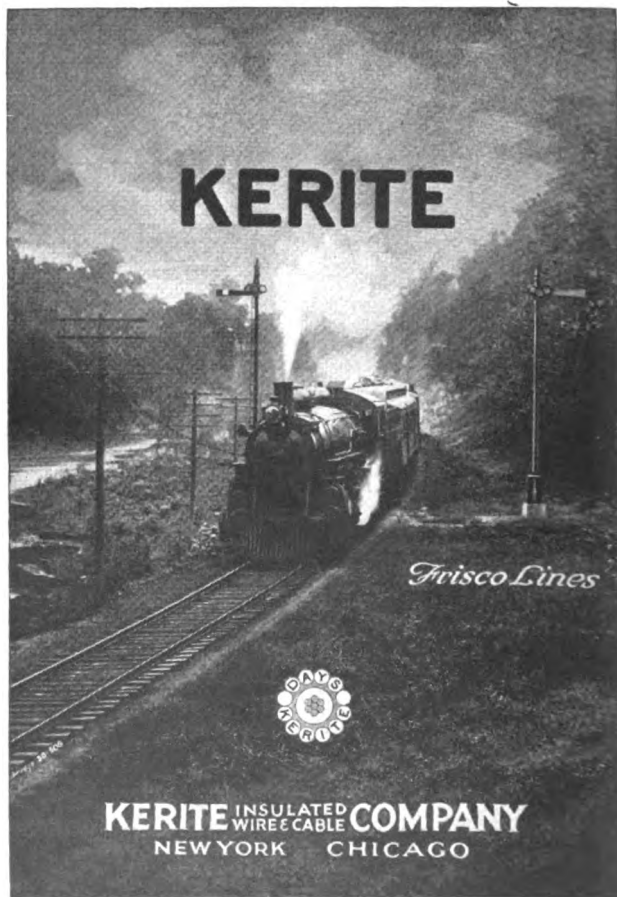
CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

*Send for new
Rail Bond Book*

American Steel & Wire
CHICAGO
NEW YORK
Company

KERITE



KERITE INSULATED WIRE & CABLE COMPANY
NEW YORK CHICAGO

ELRECO TUBULAR POLES**COMBINE**

Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request

ELECTRIC RAILWAY EQUIPMENT CO.
 CINCINNATI, OHIO
 New York City, 30 Church Street



Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMELECTRIC PRODUCTS**BARE COPPER WIRE AND CABLE****TROLLEY WIRE****WEATHERPROOF WIRE
AND CABLE****PAPER INSULATED
UNDERGROUND CABLE****MAGNET WIRE**

AMERICAN ELECTRICAL WORKS
 PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams;
 Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

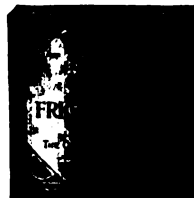
**International Creosoting
& Construction Co.**
 Galveston, Texas

Plant—Texarkana Beaumont Galveston

MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling,
 bridge timbers, etc.

*See our full page advertisement
 in last week's issue*

DUNDEE "A" AND "B" FRICTION TAPES

Great Adhesive
 Strength
 High Quality
 Long Life
 Price Right



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Incorporated 1884

Sales Offices: New York—Atlanta—San Francisco
 Agents: Central Electric Co., Chicago, Ill. Pettingell-Andrews
 Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cin-
 cinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.



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Wires, Cables, Cable Accessories
 Superior quality, economical prices
Standard Underground Cable Co.
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Shaw Lightning Arresters

Standard in the Electric Industries
 for 35 years

Henry M. Shaw

150 Coit St., Irvington, Newark, N. J.

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Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and
 Malleable Iron Frogs, Crossings, Section Insulators, Section Switches



Albert & J. M. Anderson Mfg. Co.
 289-93 A Street Boston, Mass.
 Established 1877

Branches—New York, 135 E'way

Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
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**ROEBLING****INSULATED WIRES AND CABLES****JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY**

Lapp Insulators

Lapp Insulator Co., Inc. Le Roy, N.Y.

Trade Mark

Chapman
Automatic Signals

Charles N. Wood Co., Boston**HUBBARD TURNBUCKLES**

Drop Forged to
 insure reliability
 and strength.



Type B, Eye and Hook

Double Hot
 Galvanized to
 preserve that
 strength.

HUBBARD & COMPANY
 PITTSBURGH CHICAGO

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TROLLEY WIRE

ANACONDA COPPER
 MINING COMPANY
 Conway Building, Chicago, Ill.

THE AMERICAN
 BRASS COMPANY
 General Office: Waterbury, Conn.

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**Builders since 1868 of
Water Tube Boilers
of continuing reliability**

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ATLANTA, Candler Building
TUCSON, ARIZ., 21 So. Stone Avenue
DALLAS, TEX., 2001 Magnolia Building
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PORTLAND, ORE., 805 Gasco Building



WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893**

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DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
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'CARNEGIE'
for
**WHEELS
AXLES
RAILS
CROSS TIES**

Carnegie Steel Company
PITTSBURGH, PENNA.

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE
CONSTRUCTION

New York Switch & Crossing Co.
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Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

Sales Offices:

Atlanta	Chicago	Cleveland	New York
	Philadelphia	Pittsburgh	
	<i>Pacific Coast Representative:</i>		
	United States Steel Products Company		
Los Angeles	Portland	San Francisco	Seattle
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GODWIN STEEL PAVING GUARDS

Adapted to all types
of rails and
paving.

W. S. GODWIN CO., Inc.



Proven by
service to
economically pre-
vent seepage and
disintegration of
street railway paving.
*Write for Illustrated
Catalog No. 20.*
Race & McComas Sts.,
Baltimore, Md.

RAMAPO AJAX CORPORATION

Ramapo Automatic
Return Switch
Stands
for Passing
Sidings



RACOR Tee Rail
Special Work.
Manganese
Construction

GENERAL OFFICES: HILLBURN, NEW YORK

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Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

METAL SAFETY CROSS TIES

Eliminate from track assemblage all spikes, plates, anchors, braces,
lugs, bolts, etc.

REVOLUTIONIZES ROADBEDS

Write for descriptive folder and quotation.

METAL SAFETY RAILWAY TIE CO.

522 North American Bldg., PHILADELPHIA, PA.

OXYGEN

FOR CUTTING, WELDING, ETC.

INTERNATIONAL OXYGEN COMPANY

NEWARK NEW YORK PITTSBURGH TOLEDO

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,
Condensers, Gas and Oil Engines, Air Compressors,
Air Brakes

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we all
differ only in magnitude; small orders command our utmost care
and skill just as do large orders. CAMERON quality applies to
every coil or segment that we can make, as well as to every
commutator we build. That's why so many electric railway men
rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut



OHMER FARE REGISTERS

They indicate and record the exact amount of each transaction. They place the sale of transportation on a strictly business basis.

We manufacture Indicating and Recording Fare Registers, Receipt Issuing Taximeters, and Fare Boxes.

OHMER FARE REGISTER CO.
Dayton, Ohio

THE WORLD'S STANDARD "IRVINGTON"

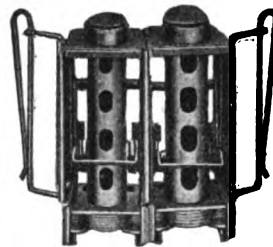
Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.

Sales Representatives in the Principal Cities

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No.
478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

Fare Boxes

Change Carriers

COIN
COUNTERS SORTERS WRAPPERS

THE CLEVELAND FARE BOX CO.

CLEVELAND, OHIO
Canadian Branch, Preston, Ontario.



Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for
HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois

BUCKEYE JACKS

high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.

Alliance, Ohio



Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.



Direct
Automatic
Registration
By the
Passengers
**Rooke Automatic
Register Co.**
Providence, R. I.

Heywood-Wakefield CAR SEATS

of pressed Steel for all Classes of Passenger Service. Pattern for covering seats and for snow sweepers.

HEYWOOD-WAKEFIELD CO.

Factory at Wakefield, Mass.

Offices at New York, Chicago, San Francisco



Since
1907

Other Ry. Motor Gear Mfrs.
have brought out a total of
22 grades of gearing
each one "as good as Tool Steel"
BUT

Cincinnati "Tool Steel" is still
the Standard of Quality
Tool Steel Quality

The Tool Steel
Gear and Pinion Co.

CINCINNATI, O.

Brake Shoes A.E.R.A. Standards

Diamond "S" Steel Back is the Best Type



Standard
Patterns
for

**SAFETY
CAR**



D-67 for Narrow Treads
D-87 for Wide Treads

American Brake Shoe and Foundry Co.
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CHILLINGWORTH



One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and
Economy. Write Us.

Chillingworth Mfg. Co.
Jersey City, N. J.

**Only Reliable Products Can
be Continuously Advertised**

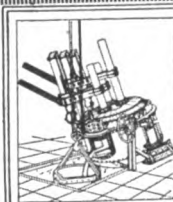
"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.

CAR AXLES

J. R. JOHNSON AND CO., INC.

FORGED STEEL AXLES

For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or
Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large
Shafts, Round Bars, etc.



**Moore Rapid
Electromelt
Furnaces**
Ten Standard Sizes 1/2 to 24 Tons Capacity
Most Rapid and efficient for making
Tool Steels, Alloy Steels, Forging Steels
Steel Castings, Malleable Iron, Grey Iron
Carbide, Ferro-Alloys etc.
PITTSBURGH ELECTRIC FURNACE CORPORATION
P.O. Box 1125. PITTSBURGH, PA.

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings
Bemis Pins are absolutely smooth and true in diameter. We
carry 40 different sizes of case hardened pins in stock. Samples
furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.



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SIDE
BEARINGS**

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 5 cents a word, minimum charge \$2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 3 inches.....\$4.50 an inch
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Rates for larger spaces, or yearly rates, on request.
An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

R.F.I.

POSITIONS VACANT

SALES engineer wanted, familiar with steam and street railway special track work, capable of securing field data for the manufacture of same. Must have had experience with manufacturer of special track work. State experience, approximate salary, age and education. P-643, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

ARMATURE winder, 10 years' electrical experience, 7 years on railway motors, single, 30 years, willing to go anywhere. PW-652, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

EMPLOYMENT and personnel man. Now with large company operating surface and elevated lines. Married and in his thirties. Willing to locate anywhere. PW-649, Elec. Ry. Jour., Real Estate Trust Bldg., Phila., Pa.

SUPERINTENDENT, nine years' railway and some lighting experience, desires correspondence with managers wishing the services of a capable, efficient, energetic, official. Will consider position in West Indies. PW-642, Electric Railway Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT of transportation, at present with large property, solicits correspondence with managers that are in the field for a superintendent of wide experience. Capable progressive and recognized as an economical painstaking official. High-grade references. Personal reasons for desiring a change. PW-653, Electric Railway Journal, Leader-News Building, Cleveland, Ohio.

WANTED position with electric railway company. Young man 29 years old, with 9 years' of valuable experience in transportation and mechanical departments. PW-650, Elec. Ry. Jour., 10th Ave. at 36th St., New York.

WANTED to locate with city or interurban railway in equipment, distribution, purchasing, construction, traffic and transportation or other capacity requiring engineering ability. Over ten years' experience in railway and power manufacturing, installation, operating. Your proposition solicited. PW-651, Electrical Railway Journal, Old Colony Bldg., Chicago, Illinois.

WANTED

Used Car Wheel Lathe

For street and interurban railway wheels up to 36-in. diameter. Must be in good condition.

W-644, Electric Railway Journal
1570 Old Colony Bldg., Chicago, Ill.

FOR SALE

50—G. E. No. 80-A Motors.
50—Controllers, K-28-B; K-12.
35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

In Replying to "Blind" Ads

be careful to put on envelope the key number in the ad and also local address of office to which reply is sent.

10th Ave. at 36th St., New York.
509 Real Estate Trust Bldg., Phila.
533 Leader-News Bldg., Cleveland.
1570 Old Colony Bldg., Chicago.
Mohr Bldg., San Francisco

Important

Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents—send copies.

0195

FOR SALE

9 HEADLIGHTS \$25.00

G. E. FORM D-18

Buffalo Housewrecking Co.
Buffalo, N. Y.

FOR SALE

RAIL BONDS

548 13 in. Type F-6, 4/0 capacity, 3/4 dia. x 3/4 in. length of terminal, 13 in. center to center. These bonds can be bought right.

WILLIAMSPORT PASSENGER RY. CO.
Williamsport, Penna.

FOR SALE

RAILWAY MOTORS

2—Unused General Electric, type 210-H, 50% of market price.

GEORGE SACHSENMAIER CO.
926 N. Third St., Philadelphia, Pa.

FOR SALE

2—80-Ton

Electric Locomotives

Used Eight Months

TRANSIT EQUIPMENT CO.

Cars—Motors
501 Fifth Ave., New York

FOR SALE

Generating Units and Boilers

2—300 kw., G. E. D.C. Generators, direct connected Buckeye Engines.
5—125 hp. Brownell Boilers, including pumps, piping and fixtures.

The Dayton, Covington & Piqua
Traction Company
West Milton, Ohio

RAILS

Cars, Locomotives, Tanks, Steel Piling
Fairbanks-Morse Standard Gage Gasoline
Motor Car; Seats 34 people

ZELNICKER IN ST. LOUIS

400 Tons 65 lb. rails

SOME ONE WANTS TO BUY

the equipment or machinery that you are not using.
This may be occupying valuable space, collecting dust,
rust and hard knocks in your shops and yards.

SELL IT BEFORE DEPRECIATION SCRAPS IT

THE SEARCHLIGHT SECTION IS HELPING OTHERS

—LET IT HELP YOU ALSO

0211

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

- Advertising, Street Car**
Collier, Inc., Barron G.
- Air Receivers & Aftercoolers**
Ingersoll-Rand Co.
- Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Armature Shop Tools**
Elec. Service Supplies Co.
- Automatic Return Switch**
Stands
Ramapo Ajax Corp.
- Automatic Safety Switch**
Stands
Ramapo Ajax Corp.
- Axles**
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Babbitt Metal**
Ajax Metal Co.
- Badges and Buttons**
Elec. Service Supplies Co.
International Register Co.
- The**
- Bearings and Bearing Metals**
Ajax Metal Co.
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
Gilbert & Sons E. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Bearings, Center and Boller**
Side
Stucki Co., A.
- Bells and Gongs**
Brill Co., The J. G.
Consolidated Car Heat'g Co.
Elec. Service Supplies Co.
St. Louis Car Co.
- Boilers**
Babcock & Wilcox Co.
- Bonding Apparatus**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
- Bonds, Rail**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.
- Book Publishers**
McGraw-Hill Book Co., Inc.
- Brackets and Cross Arms**
(See also Poles, Ties,
Posts, etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
- Brake Adjusters**
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
- Brake Shoes**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
- Brakes, Brake Systems and**
Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Ry. Appliance Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
- Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Stackpole Carbon Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.
- Brushes, Graphite**
U. S. Graphite Co.
- Brush Holders**
Anderson Mfg. Co., A. &
J. M.
- Brushes, Wire, Pneumatic**
Ingersoll-Rand Co.
- Buses, Motor**
Brill Co., The J. G.
St. Louis Car Co.
- Bushings, Case Hardened and**
Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
- Cables, (See Wires and**
Cables.)
- Cambric Tapes, Yellow and**
Black Varnish
Irvington Varnish & Ins. Co.
- Carbon Brushes (See Brushes,**
Carbon)
- Cars, Dump**
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.
- Car Lighting Fixtures**
Elec. Service Supplies Co.
- Car Panel Safety Switches**
Consolidated Car Heat'g Co.
Westinghouse E. & M. Co.
- Cars, Passenger, Freight, Ex-**
press, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
- Cars, Gas, Rail**
Brill Co., J. G., The
St. Louis Car Co.
- Cars, Second Hand**
Abel, G. T.
Albany Southern E. R. Co.
Buffalo House Wrecking &
Salvage Co.
Electric Equipment Co.
Transit Equipment Co.
- Cars, Self-Propelled**
Brill Co., J. G., The
General Electric Co.
- Castings, Brass, Composition**
or Copper
Anderson Mfg. Co., A. &
J. M.
- Castings, Gray Iron and Steel**
Bemis Car Truck Co.
St. Louis Car Co.
- Castings, Malleable and Brass**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
St. Louis Car Co.
- Catchers and Retrievers,**
Trolley
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
- Catenary Construction**
Archbold-Brady Co.
- Change Carriers**
Cleveland Fare Box Co.
- Circuit-Breakers**
General Electric Co.
Westinghouse E. & M. Co.
- Clamps and Connectors for**
Wires and Cables
Anderson Mfg. Co., A. &
J. M.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Cleaners and Scrapers Track**
(See also Snow-Plows,
Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.
- Clusters and Sockets**
General Electric Co.
- Coal and Ash Handling (See**
Conveying and Hoisting
Machinery)
- Coll Banding and Winding**
Machines
Elec. Service Supplies Co.
- Colls Armature and Field**
Economy Electric Devices Co.
General Electric Co.
Westinghouse E. & M. Co.
- Colls, Choke and Kicking**
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General Electric Co.
Westinghouse E. & M. Co.
- Coin Counting Machines**
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.
- Coin Sorting Machines**
Cleveland Fare Box Co.
- Coin Wrappers**
Cleveland Fare Box Co.
- Commutator Slotters**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Commutator Truing Devices**
General Electric Co.
- Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Compressors, Air**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
- Compressors, Air Portable**
Ingersoll-Rand Co.
- Condenser Papers**
Irvington Varnish & Ins. Co.
- Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
- Connectors, Solderless**
Westinghouse E. & M. Co.
- Connectors, Trailer Car**
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Anaconda Copper Mining Co.
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St. Louis Car Co.
Samson Cordage Works
- Cord Connectors and Couplers**
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
- Couplers, Car**
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
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- Crossings**
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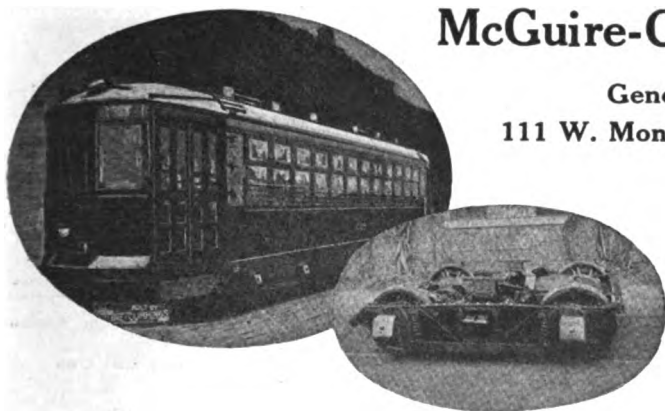
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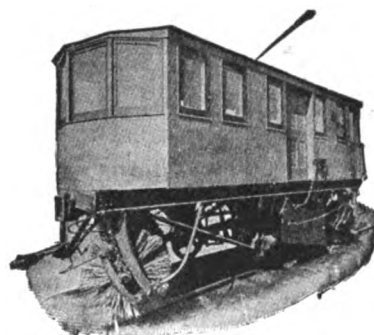
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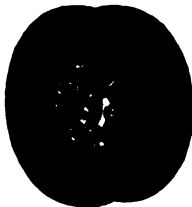
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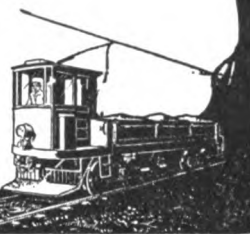


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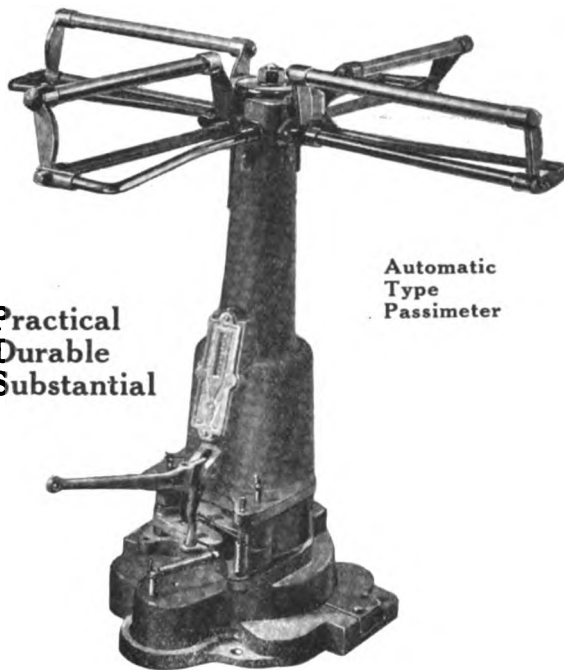
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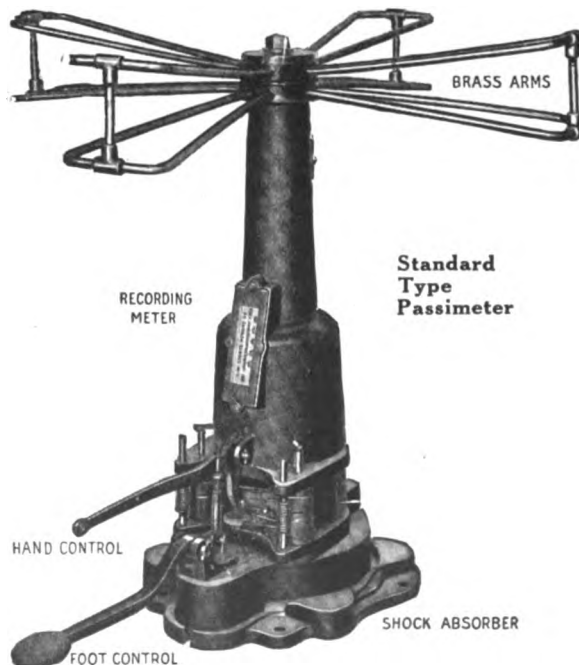


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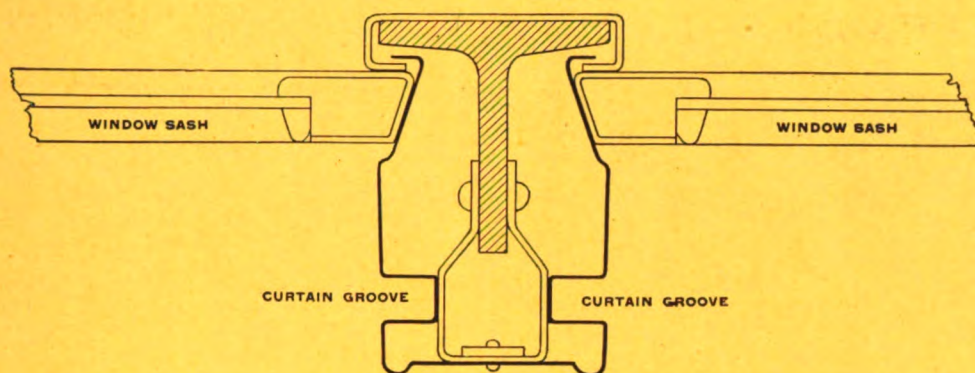
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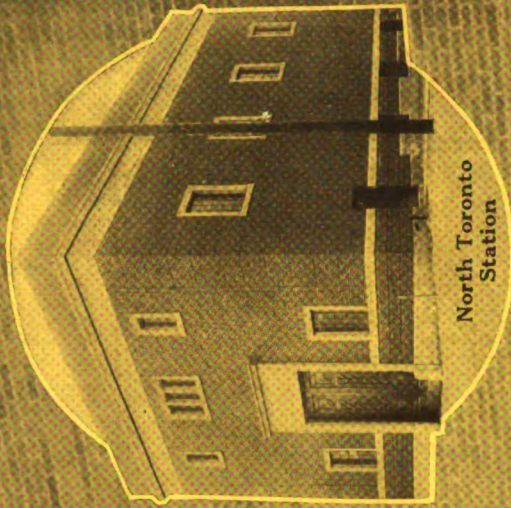


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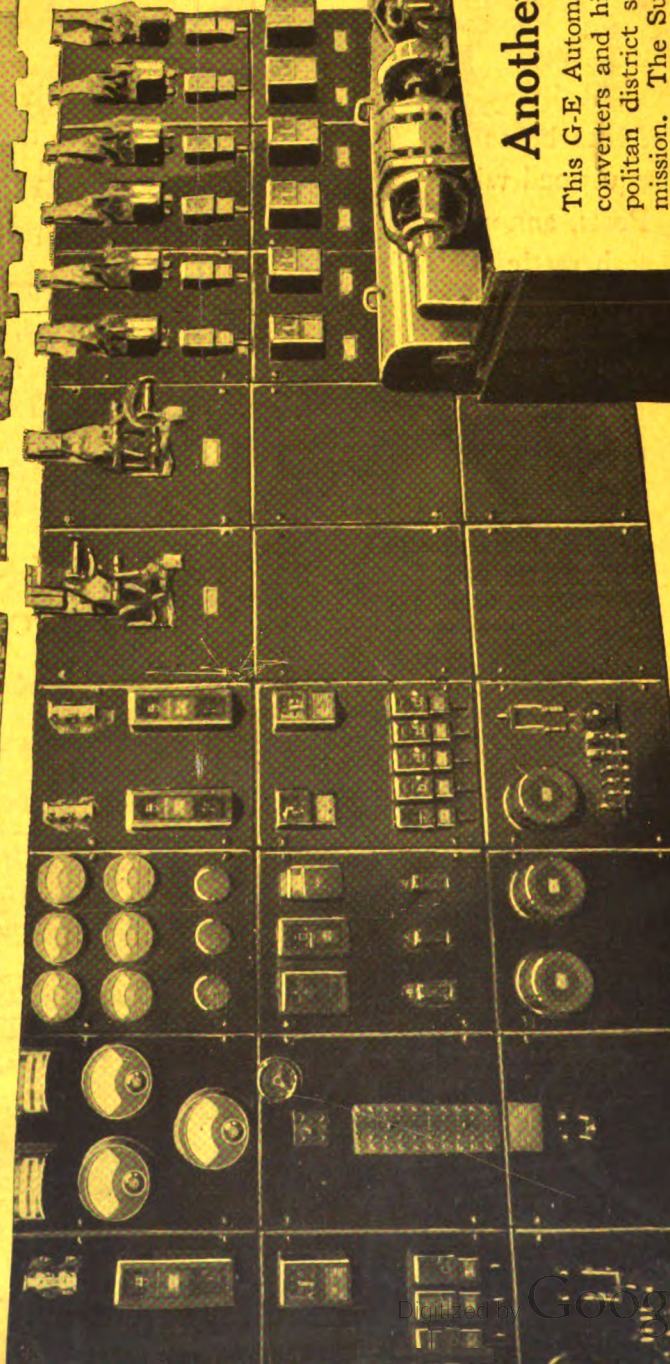
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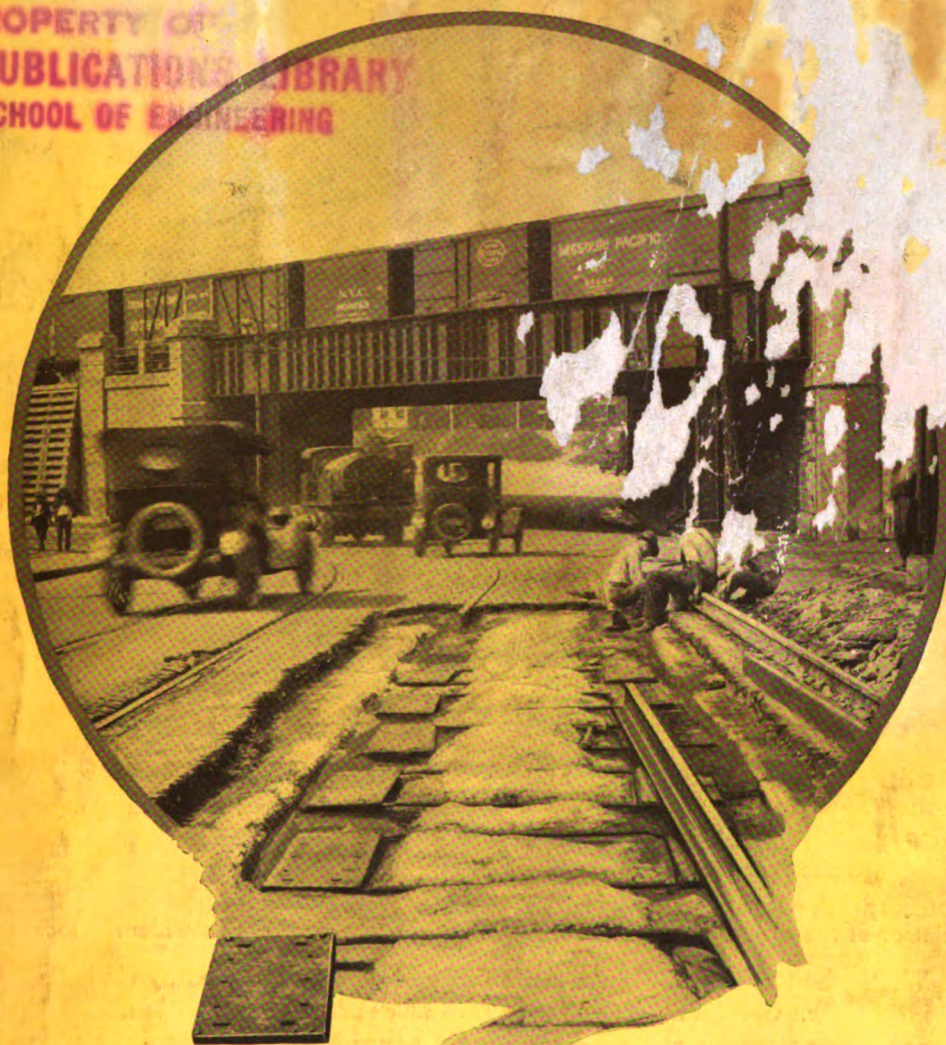
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GENERAL ELECTRIC

MONTHLY MAINTENANCE ISSUE

ELECTRIC RAILWAY JOURNAL

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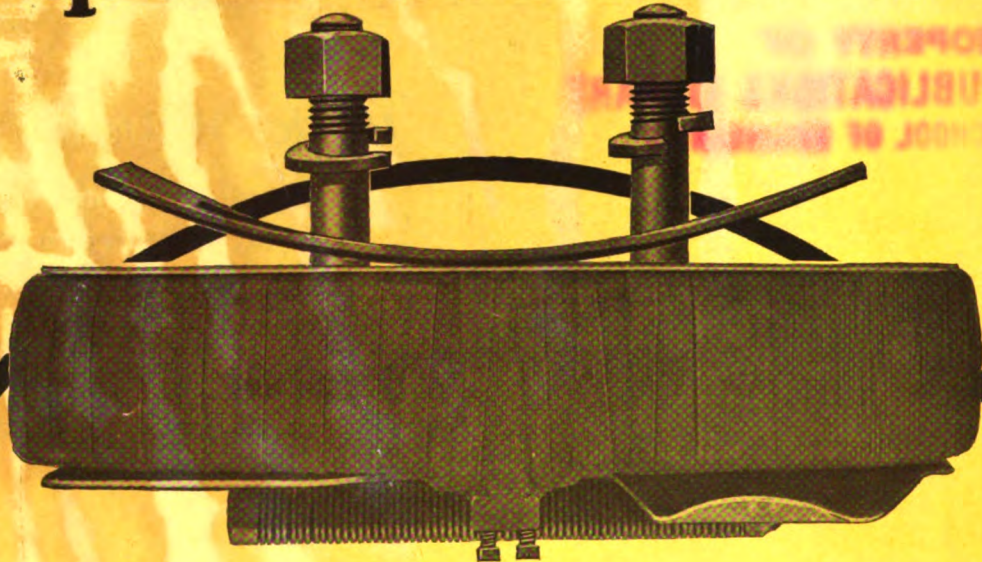
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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

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1924

Pride, With Reason

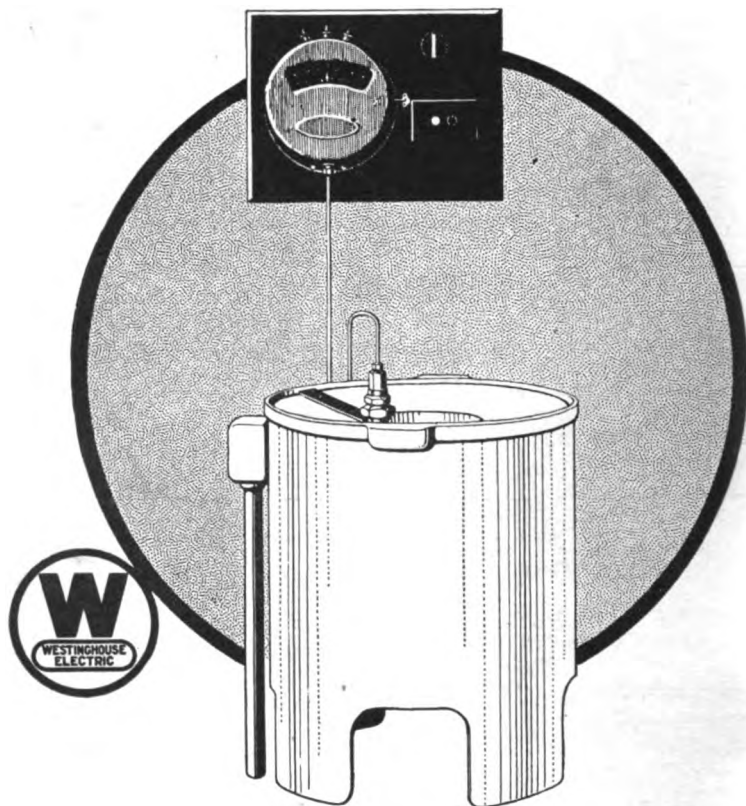
IT'S an interesting observation how differently railway men feel about mention of their companies in the JOURNAL. Some are rather indifferent—think it a matter of no great importance one way or the other. They are courteous to us but have no sense of doing things that the other fellow would want to know about. A few—a very few—are opposed to any publicity at all concerning the affairs of their particular railway. But the majority are glad to have their accomplishments told to the entire industry, and feel that an article in the JOURNAL may not only be of benefit to other companies, but is of advantage to the company whose activities are related.

Seldom, however, is a greater enthusiast for publicity found than with the road whose men are on their toes, aggressive, doing new things to improve the operation, and know it.

This kind of organization is perhaps typified by the remark one railway manager recently made to a JOURNAL editor on paying his property a visit: "Surely—anything you want. You can tell the world about us. We're proud of this railway."

And that spirit of the G. M., as is usual, permeated the whole organization. Think what such a spirit means toward the success of a railway.

This new automatic electric melting pot — designed and built by Westinghouse — will help reduce babbitting costs. It is clean, safe and dependable in operation. Made in two sizes, capacities 150 and 750 pounds of metal.



The correct Pouring Temperature — Automatically Maintained.

The charge is never too hot or too cold. Close regulation of temperature means better work. Automatic control aids production, for the workman can devote his entire time to productive work. This melting pot maintains the correct pouring temperature indefinitely without attention.

The Westinghouse automatic melting pot is economical in the use of energy. Heat insulating material reduces radiation losses, and Westinghouse automatic control reduces current con-

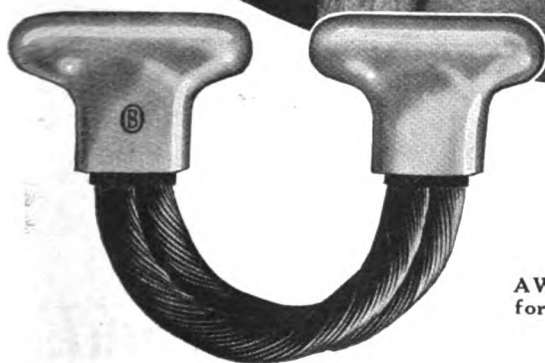
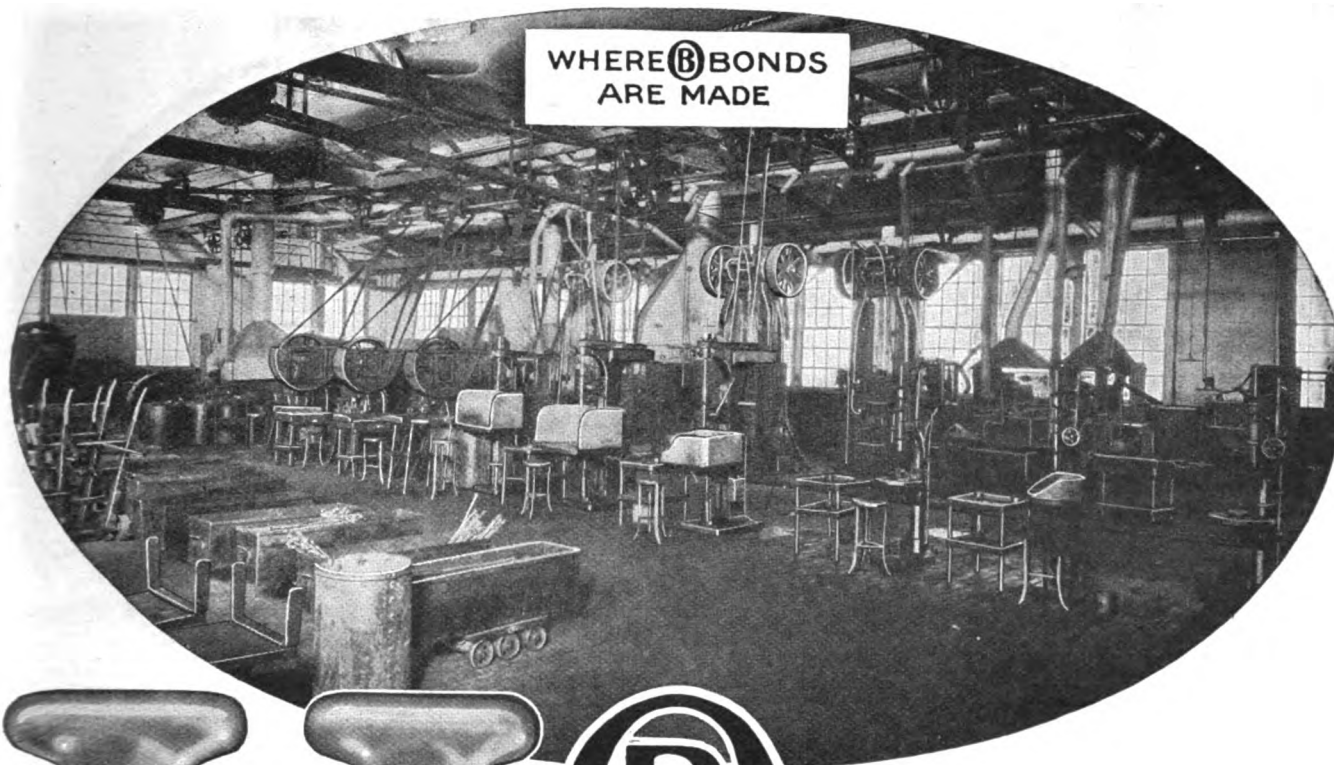
sumption. No energy is wasted.

Operating at temperatures between 450° F and 950° F, Westinghouse automatic melting pots may be used for melting solder, babbitt, lead, zinc, etc. When used for heating oil for drawing temper, remarkably uniform results are obtained.

Additional information will be gladly sent upon request. Write the nearest Westinghouse office for leaflet 1868. Offices in all large cities. Consult your telephone directory.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse



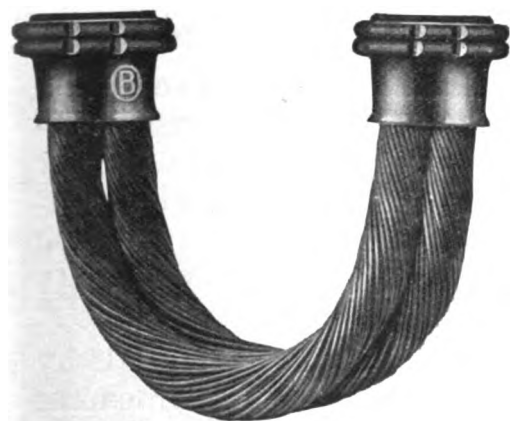
AW-8 Arc Weld
for Ball of Rail



RAIL BONDS

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Lion or Lamb?

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Cast your eye over the picture gallery at the right. It shows the equipment used by big roads and small from Phillie to the Philippines—and back from China to Chi.

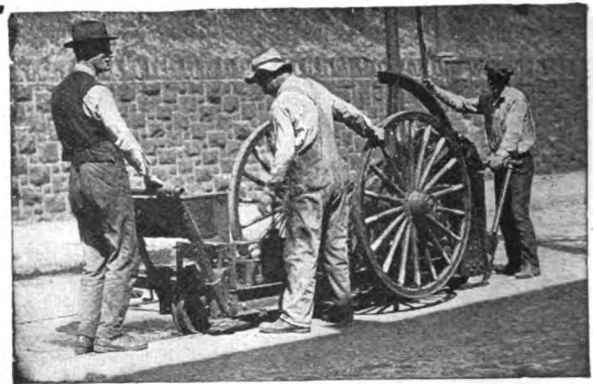
*Now's the time to read up
before you stock up. Bulle-
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are waiting for you.*

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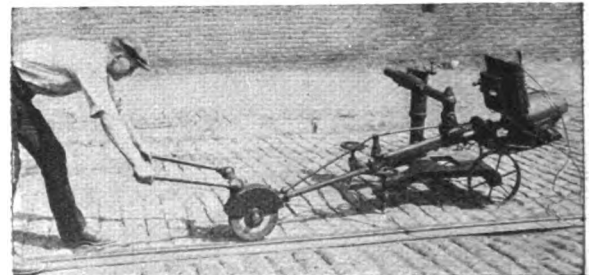
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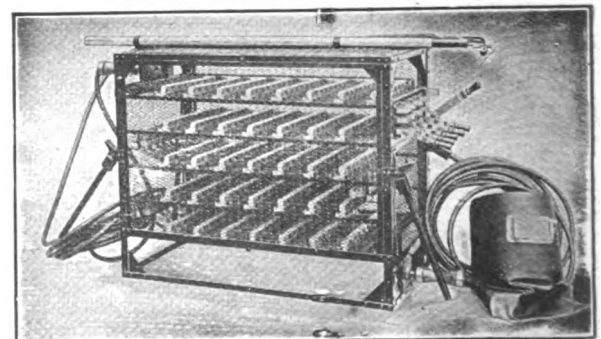
"Universal" Rotary Track Grinder



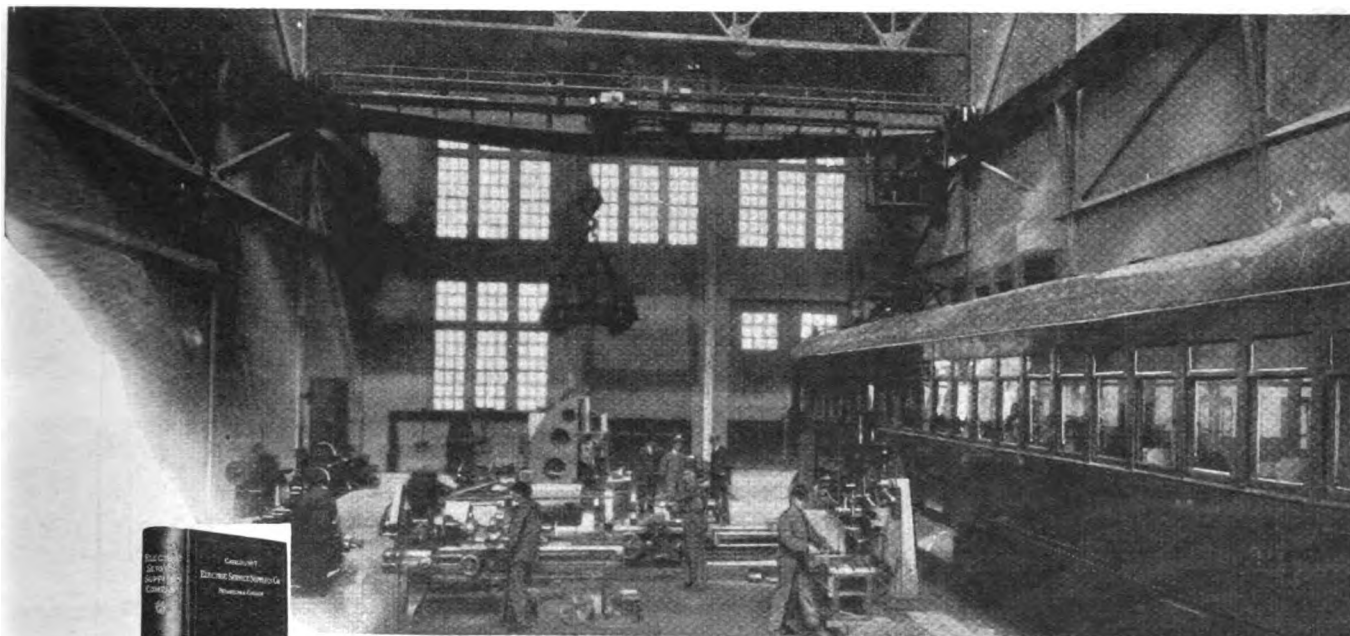
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Because: — the circular tube is the one shape which develops the maximum strength of the metal in all directions. Like the arch in masonry construction, the tubular steel pole is recognized by engineers as the strongest and most reliable section to use. Especially valuable at corners where pull-offs tie in at various angles. Tubular steel poles are cheapest to maintain, and easiest to paint.

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Why— Elreco Tubular Steel Poles?

Because: — Elreco's *patented wire lock swedge joint* increases the natural efficiency of the tubular pole by making the joints as strong as the pole itself. They will not collapse or telescope at the joints. Notice the construction illustrated below.



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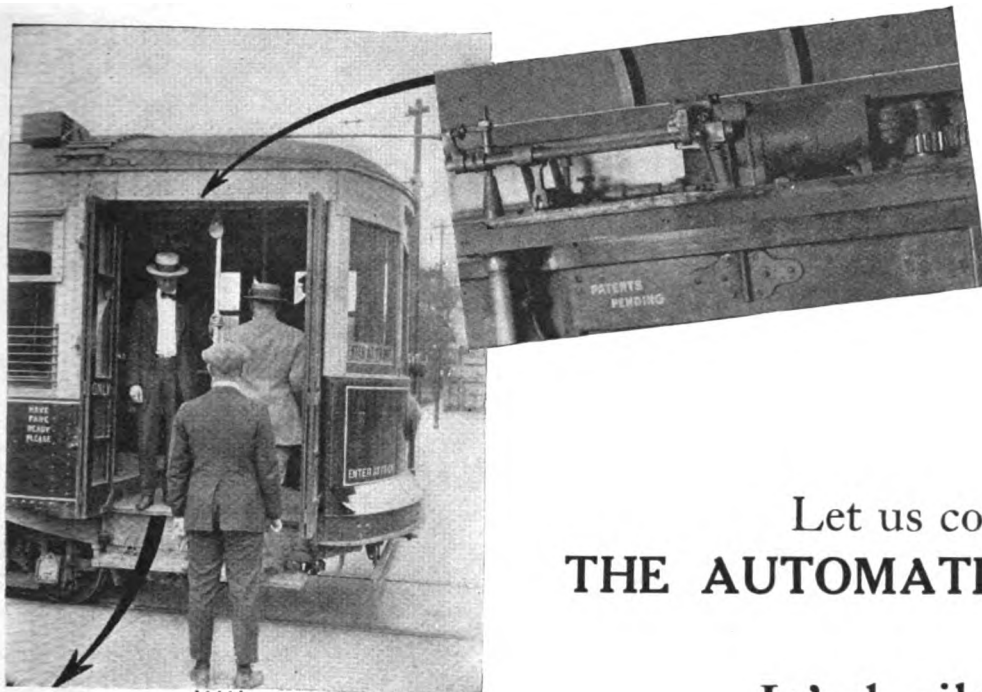
*Patented Wire Lock Swedge Joint,
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Cincinnati, Ohio

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It's built with NATIONAL PNEUMATIC EQUIPMENT

Do you realize what it is—and what it does?

It's a built-in treadle arrangement, by means of which the passenger's weight, coming on the treadle, actuates the pneumatic door engine and opens the door—*after the car has stopped*. As soon as the passenger steps off, the door closes itself. The equipment is properly interlocked with the control devices so that the motorman cannot start until the door is closed.

Think what this means! It frees the motorman of the arduous, distracting job of watching and operating the door. It's all automatic, interlocked, safe—safer than human operation.

Consider its possibilities.

Our representatives will gladly go into it with you.

National Pneumatic Company, Inc.

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PRINCIPAL OFFICE: 50 Church St., NEW YORK

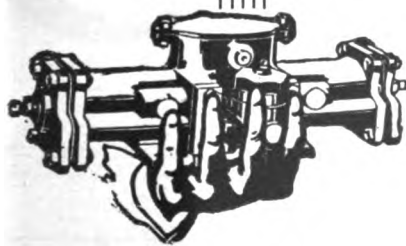
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Manufactured According to
the Established Standard



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THE POLICY: Solidly behind every product that leaves its plants. Therefore a dating nail bearing the year of treatment and the monogram of International is placed in every tie; and an open invitation that the customer make personal investigation and inspection of its plants, facilities, and methods.

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International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

International

There are three kinds of fires

And protection against one kind is not necessarily protection against the others

YOUR plant may be as well protected against fire as modern science can make it. You may be one of the few who have exactly what a fire protection engineer would recommend. But—are you sure about it?

From the protection point of view, fires can be divided into three classes: fires in ordinary combustibles; fires in “extra hazardous” inflammables like oil, paint and grease; and fires in live electrical equipment of high voltage.

There is no one extinguishing method adequate for all these fires. What works well in one emergency may fail in another. That is why so many plants are destroyed despite the presence of “fire extinguishers” of one kind or another.

Ask a fire protection engineer whether you are fully covered

The men who represent Foamite-Childs Corporation are equipped to advise you scientifically and without prejudice on the best method of protecting your property. Behind them is a great manufacturing plant where specialists in practical fire-fighting produce *every kind* of chemical extinguishing device and system.

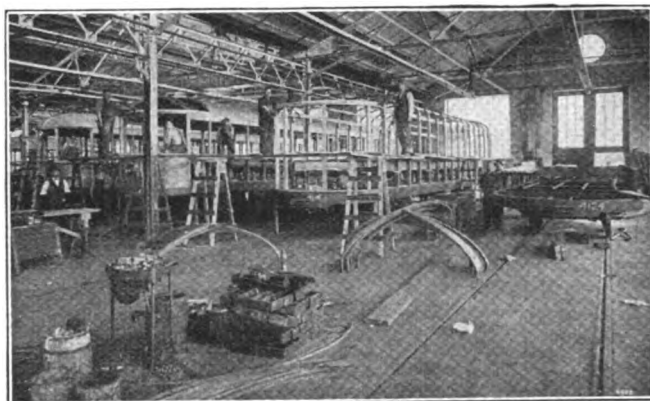
If your fire risks are well covered by your present equipment, a Foamite-Childs man will tell you so. If not, he will recommend a specific installation of one of the methods described below.

FOR BURNING OIL, PAINT, CHEMICALS, and other “extra hazardous” risks, Foamite Protection is supremely effective. Foamite equipment throws over any burning surface a blanket of carbon dioxide gas bubbles (known as Firefoam) that smothers the fiercest fire. Available in portable hand extinguishers, portable engines, and large stationary systems.

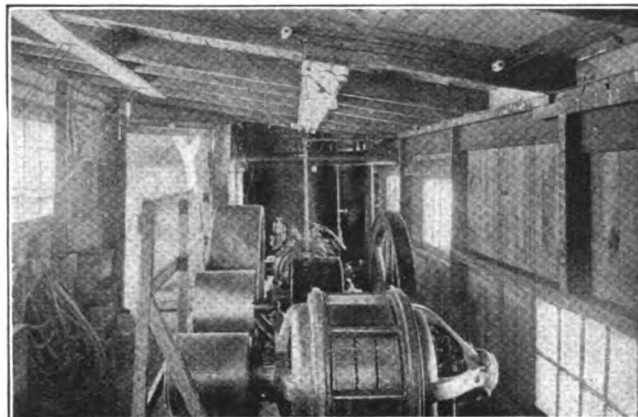
FOR ELECTRICAL FIRES, the Fire-Gun is always efficient. Its non-conducting stream stifles combustion in live electrical equipment. Adopted as standard equipment by many leading railroads and public utilities. Widely used for protecting automobiles and trucks.

WHILE FOR ORDINARY RISKS, Foamite equipment is the best protection. Where Soda-and-acid apparatus is selected, Childs extinguishers and engines have been standard for 27 years.

WHERE IT'S VERY COLD, the Allweather non-freezing extinguisher functions perfectly, down to 40° below zero, on ordinary fires.



Extra precautions are required in shops and store-rooms where ordinary fire risks are combined with such special hazards as oil and paint. Here Foamite Protection alone is adequate.



Where conditions necessitate housing high-voltage equipment in a frame building, the electrical fire hazard demands primary attention. Fire-Gun is the ideal, sure protection in this case.

Our many division offices located at convenient centers enable us to reach any plant with this personal service for analysis of risks. Write us if you would like to have a representative call. He will furnish rough estimates without obligation to you.

Send for a free copy of the illustrated booklet, “The Essentials of Self-Protection Against Fire.” It analyzes the fire hazards that threaten different industries and points out what specific methods are best to protect *your* risks.

Foamite-Childs Corporation

Fire Protection Engineers and Manufacturers

125 Turner Street, Utica, N. Y.

Foamite-Childs of Canada, Ltd., Toronto, Ont.

Sales and Engineering Representatives
in the leading cities of all countries



2000 NEW SAFETY CARS in 1923

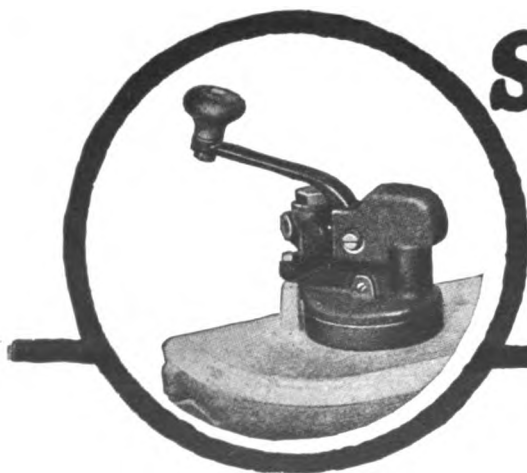
**“Earn More
by
Saving More”**

DURING 1923 we furnished Safety Car Control Equipment for 2000 new Safety Cars.

Over 1600 of the cars thus equipped for one-man, or one-man, two-man service, were newly built during the year. The balance were old two-man cars converted so as to give the owners and the public the advantage of safer and more economical operation.

These figures will dispose of any doubt which may remain as to the preferred position of the Safety Car in traction circles.

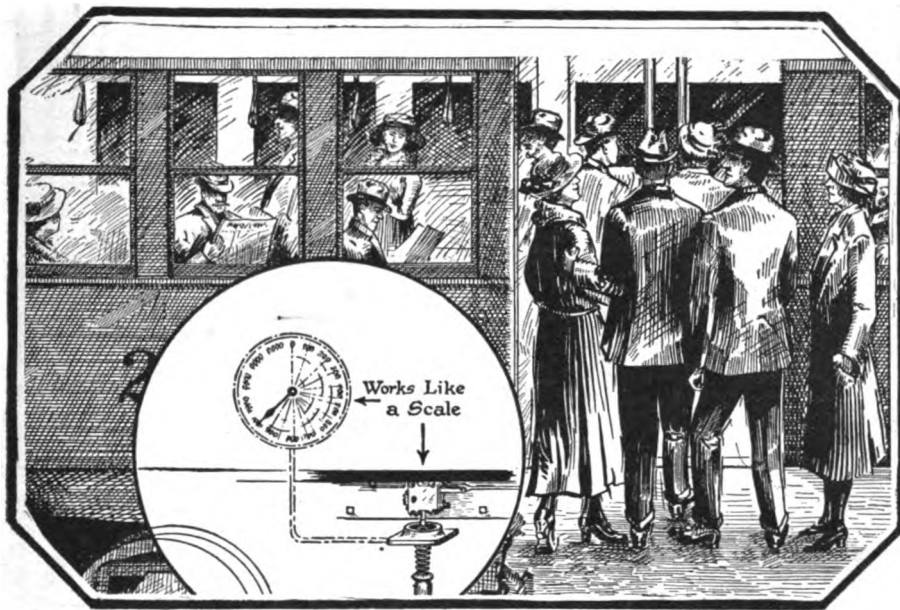
Our Air Brake and Safety Car Control Equipment makes any car a Safety Car.



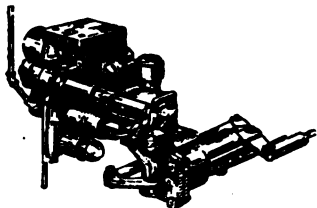
SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH



The Passengers Themselves Regulate the Braking Force



THE VARIABLE LOAD BRAKE

The Westinghouse Variable Load Brake has been developed to solve the problem of controlling cars under widely varying load conditions. It is an attachment which may be added to any straight air or semi-automatic equipment whereby the braking force is automatically adjusted to suit the weight on the car, by regulating the brake cylinder pressure as the weight changes. The adjusting mechanism is thrown into engagement by the opening of the car doors. While the doors are open, passengers are leaving and entering the car, and when the doors are closed again, the condition of loading will be that under which brake operation will take place for the next stop, or a slow-down, as the occasion may demand. The use of the Brake insures stopping within a uniform distance regardless of whether the car is empty or loaded.

The illustration above shows the principle of the Variable Load Brake as developed some years ago for use in the New York Subways.

Today the same principle is available for application to light-weight surface cars.

The braking force automatically increases or decreases to correspond with the increase or decrease of live weight. The heavier the load, the greater the braking force. As the load diminishes the braking force diminishes.

The result is obvious.

A car, empty or loaded, is supplied with the same proportionate braking force and can be stopped in the same distance. The safety factor is greatly increased, less time is lost in deceleration with heavy loads, earning ability of rolling stock is greater.

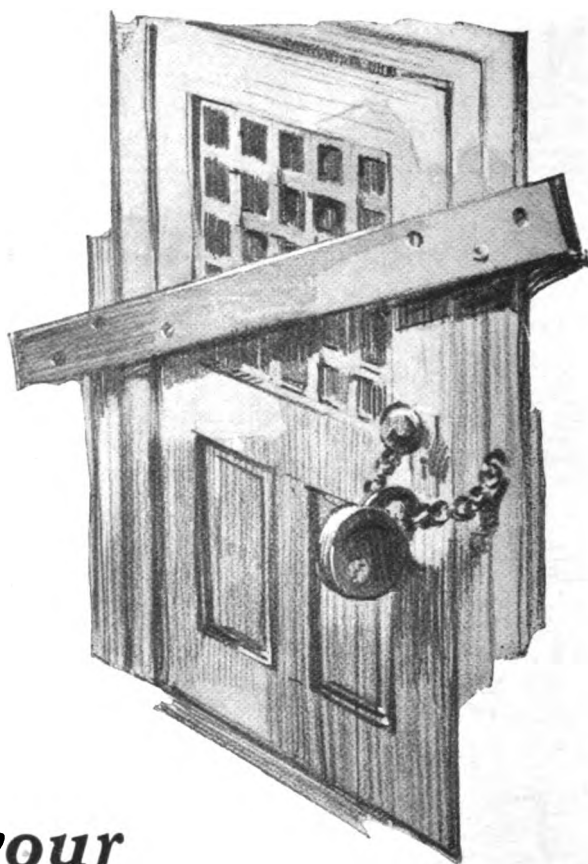
Send for Publication T-2045

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works: WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES

Locked!



*—isn't it time
you opened your
supply room door?*

You have a motor and control stock room within easy call which might as well be locked—unless you use it. It is the stock at the nearest Western Electric Distributing House.

Unlock this source of supply. Think of this stock as your own reserve, ready for your regular and emergency demands.

Western Electric delivery is prompt. Western Electric motors and control are dependable. Western Electric prices are fair.

Let our representative tell you more about this service. Don't wait for emergency. Call him in now.

Western Electric Company

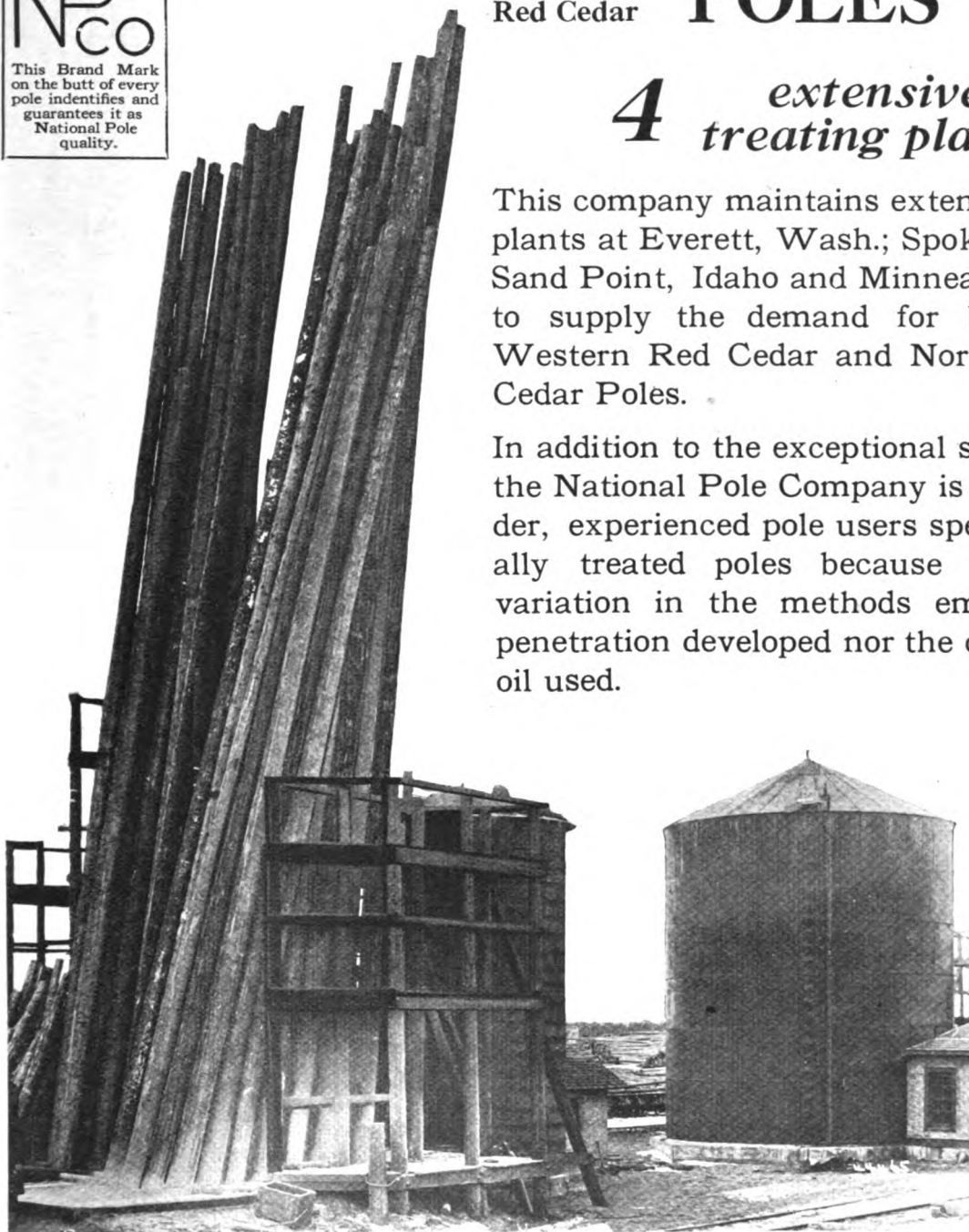
OFFICES IN 47 PRINCIPAL CITIES

Western
Red Cedar**POLES**Northern
White Cedar

4 extensive treating plants

This company maintains extensive treating plants at Everett, Wash.; Spokane, Wash.; Sand Point, Idaho and Minneapolis, Minn. to supply the demand for butt treated Western Red Cedar and Northern White Cedar Poles.

In addition to the exceptional service which the National Pole Company is able to render, experienced pole users specify Nationally treated poles because there is no variation in the methods employed, the penetration developed nor the quality of the oil used.



Concentrating and Shipping Yards

Minneapolis, Minn.
Everett, Wash.
Spokane, Wash.
Sand Point, Idaho
Vancouver, B. C.
Oakland, Calif.
Chicago, Ill.
Toledo, Ohio
Marinette, Wis.

NATIONAL POLE COMPANY

Escanaba, Michigan

Distributors:

Western Electric Company

Incorporated

Offices in 47 principal cities.

Sheared, Heated, Expanded— Shipped!

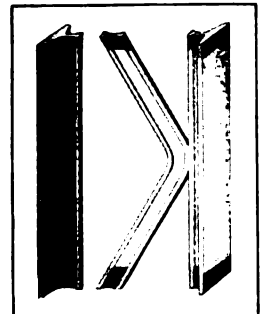
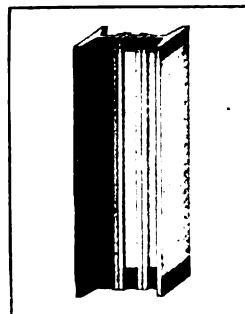
Special Rolled Bates "H" sections are sheared (cold) by an enormous rotary shear and charged directly into an oil combustion furnace, and the sheared and heated beams are drawn endwise from the furnace and automatically charged into the expander. The expander grips the flanges and expands the beams. The act of expanding the beams elongates the web portion between the points of unsheared intact, creating, without waste of material, perfect Bates One-Piece Poles.

The expanded poles are drawn from the expander onto moving chains, sent through a mechanical straightener, cleaned, and painted. The paint is thoroughly dry by the time the pole has become cool and the finished pole is ready for shipment.

Rapid production makes Bates Poles economical in first-cost — their simplicity makes them easy to maintain.

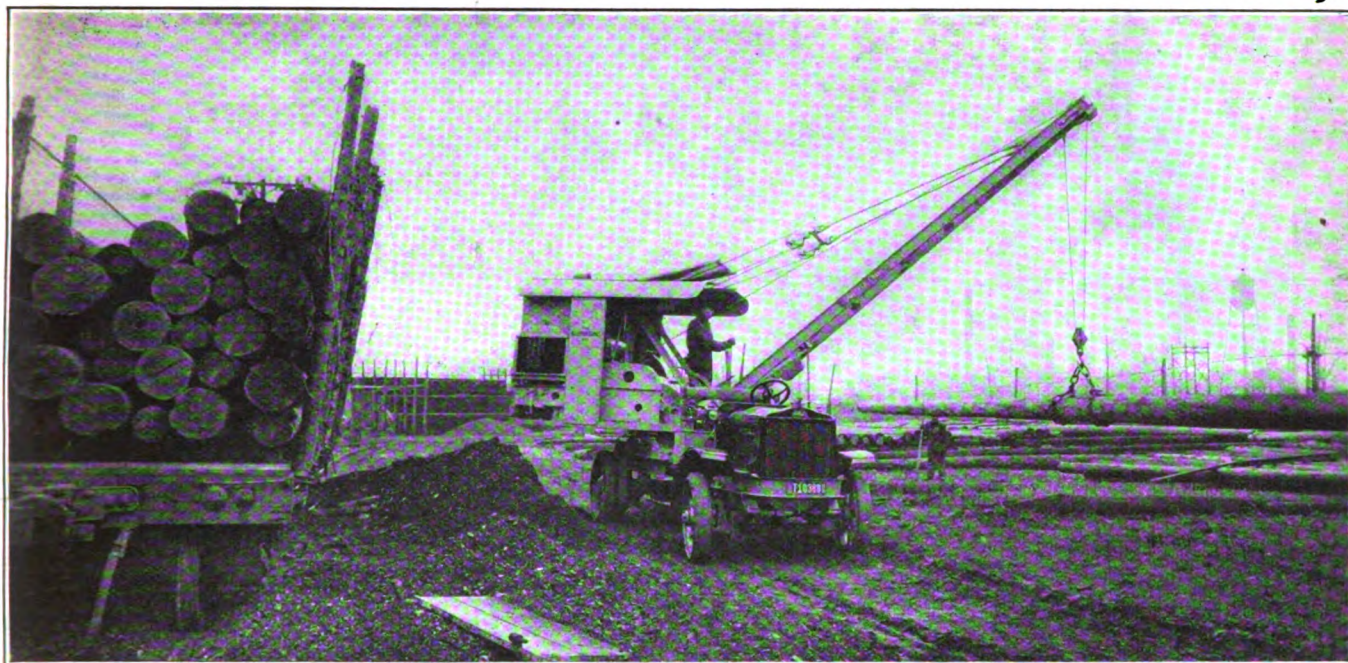
Before Expanded

After Expanded



B E S T Bates Expanded Steel Truss Co.
Illinois Merchants Bank Bldg.
Chicago, Ill., U. S. A.

**BATES ONE PIECE
EXPANDED
STEEL POLES**



UNLOADING POLES

At 17% of Former Cost!

Before this company purchased a motor-truck-mounted Universal Crane it cost \$31.00 to unload a car of poles. The Universal reduced this to \$5.30 a car, or from 51 cents a pole to to approximately 9 cents. The Universal unloaded and placed the poles on trailers or skids at the rate of one a minute.

Besides the crane operator, only three men were required.

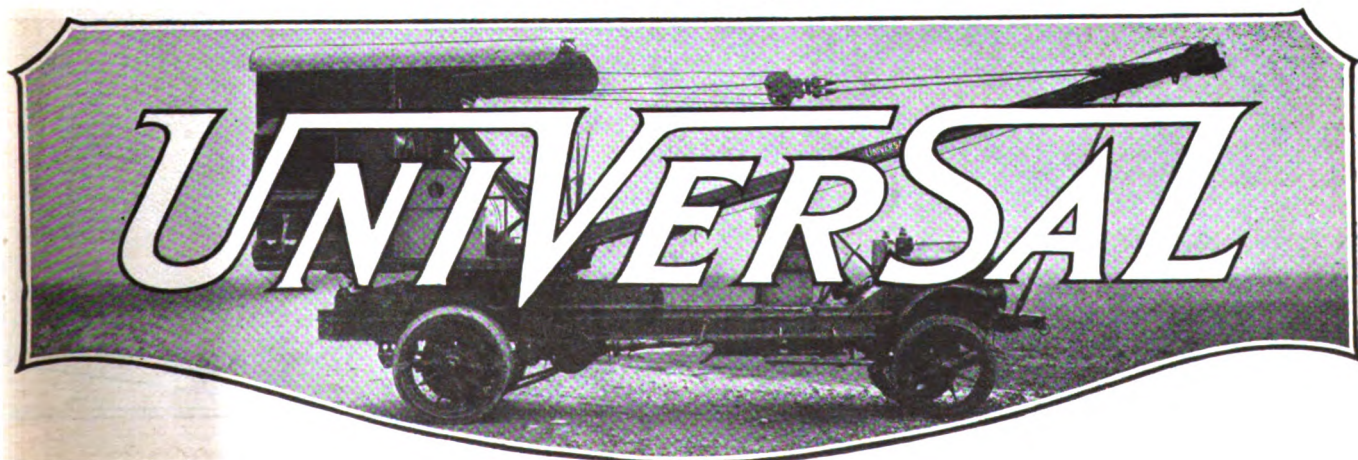
"Universals" can be driven rapidly to a job for laying and handling track work at inter-

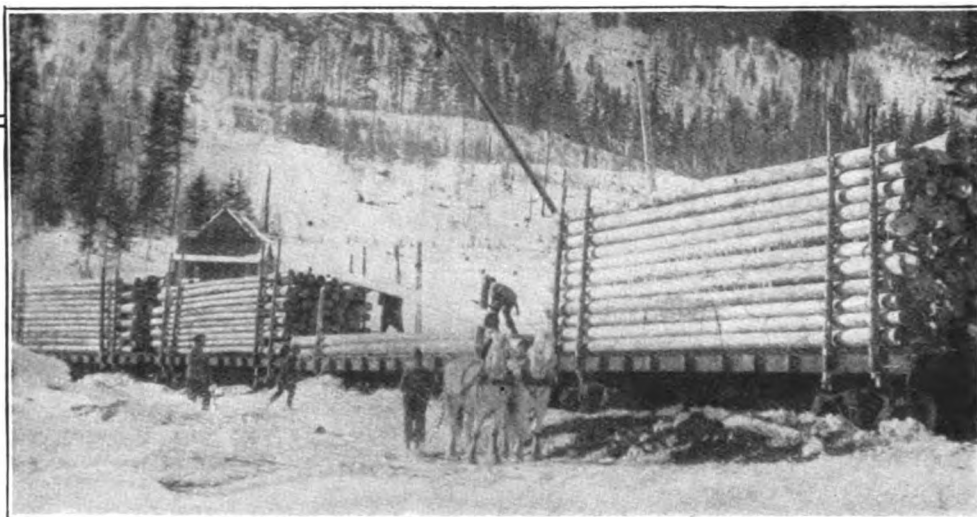
sections, loading excavated material on track replacements or extensions, setting poles, handling ballast in yards, and for replacing large gangs of men by handling all heavy lifts in the field. This is why the progressive street railways are installing them.

The Universal is the most stable motor-truck-mounted crane available. It is *full revolving* and requires *no outriggers*. Users consider it the highest grade machine in the mobile crane field. That's why there are so many fleets of them in service.

The facts about them will induce you to adopt them. Write for Bulletin H-22

The UNIVERSAL CRANE CO.
 1192 Sweetland Bldg. - Cleveland, Ohio
Branch Offices in Principal Cities





Carney

Pole handling at production centers

Our new treating plant at Minneapolis has given us larger and better pole facilities. Building this plant became necessary through our increased production of Western Red Cedar. From Forest to Transmission Line is a long way and the various processes of handling through which a

pole must go requires that these operations be carried on with regularity, even during weather conditions such as here pictured. Inspection also is efficiently performed regardless of season. Thus are we enabled to give you a reliable pole service. Service is the thing!

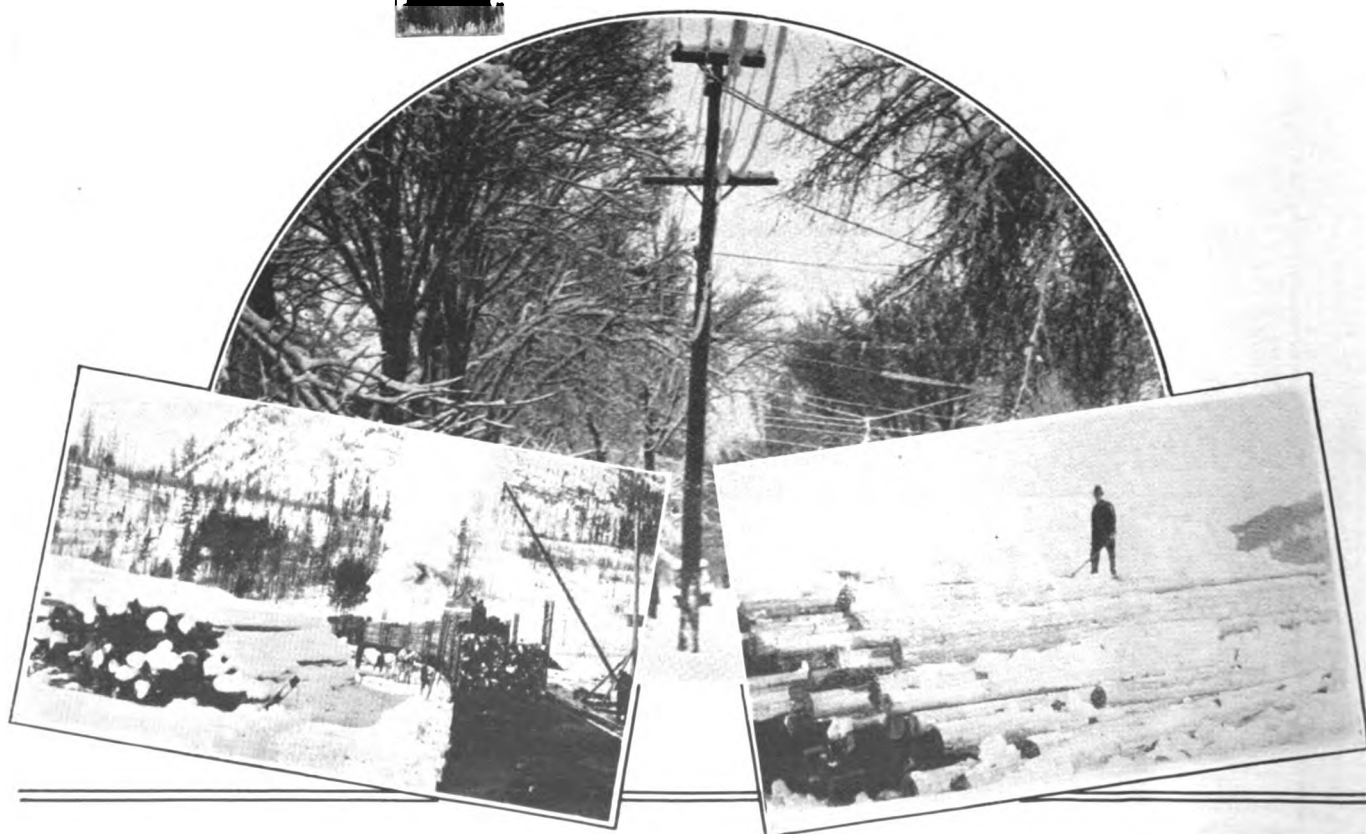
PENTREX
guarantees $\frac{3}{4}$
or $\frac{1}{2}$ inch
penetration on
every pole.

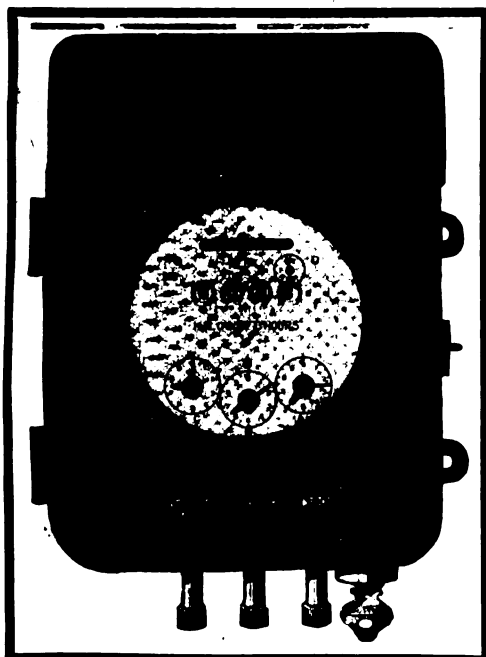


B. J. CARNEY & CO.

Spokane, Wash.

Minneapolis, Minn., Grinnell, Iowa





ECONOMY METERS

Remarkable Power Savings!

Pittsburgh County Railway, McAlester, Okla. has decreased energy consumption on Birney Safety Cars, 26.4%; Interurban Passenger Cars, 18.4%; Freight Locomotives, 22%.

Power consumption averaged 1.6 kw-hr. per car mile, which did not indicate extravagant or wasteful operation, yet the company felt that a worth-while power saving could be made if the waste could be accurately located and the motormen could see the results of their efforts.

Economy Meters

were installed on all cars and here is a five months record of the results achieved. It shows what not only can be, but actually has been accomplished.

TYPE OF EQUIPMENT	KILOWATT HOURS PER CAR MILE						Five months' average	Per cent decrease
	April blind record	May open record	June open record	July open record	August open record	September open record		
Standard Birney safety cars...	1.105	.901	.848	.754	.757	.807	.813	26.4
Two-man light weight inter-urban car.....	1.528	1.405	1.31	1.142	1.199	1.173	1.246	18.4
Freight locomotive.....	4.68	4.39	3.53	3.09	3.61	3.64	3.65	22
Average trailer ton load.....	28 T	37.4 T	21.9 T	25.7 T	42 T	30 T	31.4 T	....

Meter the Energy—that's what you want to save

The Supt. said:—"Prior to the installation of the Economy Meters the Motormen's organization unanimously passed a resolution that they were anxious to assist the company in any way they could. To them is accorded the credit."

Economy Electric Devices Company

1592 Old Colony Building, Chicago

Aluminum Field Coils

Sangamo Economy Railway Meters

Don't Spend a Dollar on Your Track (Old or New)

Until you get "INDIANAPOLIS"

Prices for Comparison

"Indianapolis" Economy Products Cost Less

Guaranteed to Save Their Entire Cost

**Thru Design, Quality, Price
and Service**

Solid Manganese Crossings

also Frogs, Mates, and Tongue-Switches.

(15 years of specializing has produced a product UNEXCELLED, and LOWEST in COST, quality considered)

Electric Welders

Thoroly EFFICIENT

(Economical and never out of COMMISSION)

Welded Rail Joints

(A COMBINATION OF EVERY ESSENTIAL FACTOR in Rail Joining and Bonding)

Welding Steel Electrodes

Absolutely Dependable

Electric Welding Supplies

Hoods, Lenses, Carbons, Etc.

"INDIANAPOLIS"

Is Saving Electric Railways Millions of Dollars Annually

The Indianapolis Switch & Frog Co.

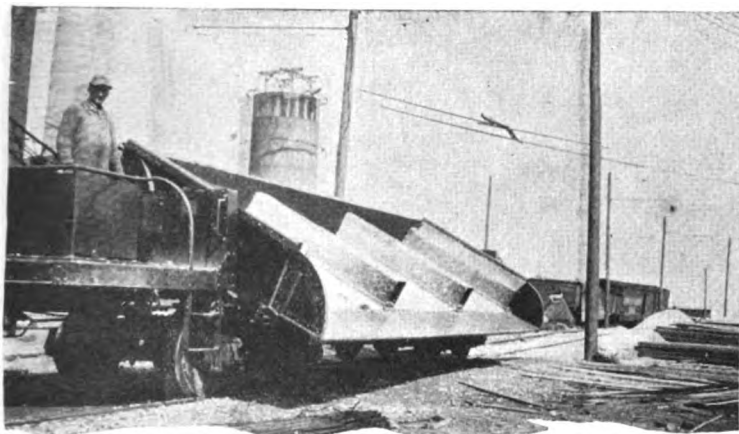
SPRINGFIELD, OHIO

Los Angeles,

San Francisco

Kansas City

Boston



Differential Door Chute Car

Item from recent issue
of ELECTRIC RAILWAY JOURNAL

Indiana Service Corporation

buys

6 Differential Door Chute Cars

and

4 Differential Bottom Dump Cars

Differential Cars

are used for

Handling Coal	Snow Removal
Hauling Freight	On Track Construction
Laying Pavement	On Track Maintenance
Ash Disposal	Highway Construction
Plowing Snow	As Electric Locomotives

**The Differential Steel Car Co.
Findlay, Ohio**



Differential Bottom Dump Car

cost is \$115,000 and the cars are to go into service on or before April 1, 1924.

Indiana Service Corporation, Fort Wayne, has placed orders with the Differential Steel Car Company of Findlay, Ohio, for six Differential door-chute trail cars of 60,000 lb capacity of the following specifications

Tilting body made of 1-in. steel plate, reinforced body divided into three compartments, each of which is to be 8 ft. 1 in. long at the floor; two center partitions to extend to top of sideboards, with end sheets rounded and with center section 14 in. above the sideboards, each compartment equipped with two doors, one at each side, hinged at top to permit of dropping; body 19 1/2 in. from floor to top of sideboards, 7 ft. 6 in. wide and 27 ft. 1 in. long, equipped with electric dumping motor of 5 hp. capacity, M.C.B. trucks, 50 ton, and M.C.B. radial couplers; 33 in. wheels; car is 40 ft. 6 in. over end sills, 8 ft. 2 in. maximum width and about 6 ft. 6 in. from rail to top of sideboards when on 33 in. wheels; equipped with air and hand brakes. Tilting body is so arranged that it can be moved from central position about 24 in. to either side and revolved through an angle of 45 deg. and automatically stopped when it reaches this discharge angle; time required for this operation, including return of body to central position, is about one minute and is effected by one man moving a controller handle in the direction the car body is to be tilted, dumping controller fitted with automatic cut-off so that body will stop when it reaches the discharge angle of 45 deg., controller lever located on platform of car

The company has also ordered four Differential bottom dump ballast-spreading cars of 60,000 lb. capacity, equipped with M.C.B. trucks and M.C.B. couplers. Some specifications of these cars follow:

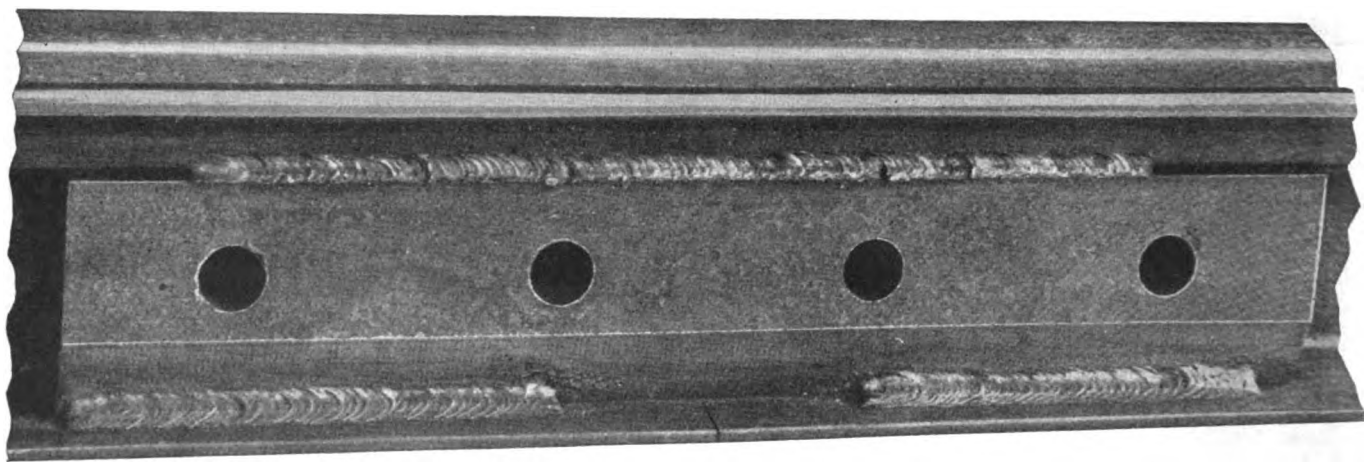
Both air and hand brakes, center dump doors may be operated by means of worm gear, or may be opened and closed by means of hand wheels on end platforms or at the sides of the car; doors divided into three parts, each one of which can be kept closed and the others opened for discharging material; doors built of steel plate and may be used to spread ballast as it is dumped.

UNA

RAIL JOINTS

Mean Continuous Rail—

*with no change in the original steel structure
of the running surface of the rail*



THAT is the modern UNA Rail Joint. The Joint itself is practically eliminated as far as the usual effects of a joint are concerned. It leaves the track, a continuous piece of rail and eliminates the impact or pound with its consequent "cupping" and the ultimate break-down of the joint.

With the rail ends under compression—with the gap between the rail ends entirely eliminated, the car wheel passes from rail to rail without impact—without the cold flow of metal into the gap that ultimately must mean—a "cup."

No excessive heat is applied to the running surface of the rail. The steel at the joint is still the original steel structure supplied by the mill. It means the same degree of wear—no

more, no less—at the joint as at any other part of the rail; that is, a joint with the life of the rail itself.

Based on sound and approved engineering principles, the UNA Joint in addition to long life and strength offers the many features of the seam-welded joint, namely,

1. Applicable to old and new track.
2. Installed under traffic without delays.
3. Extreme portability of welding apparatus.
4. Applicable for small railway properties as well as large.
5. Economical and efficient.

"Investigations of Seam Welded Rail Joints" discusses in detail the extensive development and testing program covering Seam Welded Rail Joints. May we mail your copy?

Rail Welding & Bonding Co., Cleveland, Ohio

Manufacturers of

—UNA RAIL BONDS—



Electric Railway Lubrication

Becomes a part of your organization

When Galena Lubrication is installed on your road *Galena Service* becomes an integral part of your working force. The practical assistance it affords your mechanical department through placing lubrication conditions on the right basis is quickly reflected by noticeable improvements in operating efficiency.

Galena Service Engineers are not theorists. Their efforts are not expended in experimental trials of this or that method in the hope of finding the right one. Trained specialists in lubrication, familiar with every type of equipment, their active co-operation becomes an asset of positive value in enabling your organization to maintain a high standard of service and effect a material reduction in maintenance costs.

GALENA SERVICE provides the surest and most logical means of securing efficiency and economy in lubrication. It works with and for your road for the purpose of securing the greatest possible return for every dollar expended for this item of maintenance. It has proven a most welcome auxiliary to Electric railways everywhere.



Galena-Signal Oil Company

New York

Franklin, Pa.

Chicago

and offices in principal cities



General Electric Auto

Company	Substations	Kw. Rating	Machine	In Operation	Service
Adirondack Electric Power Corp.	Little Falls	1-300	Converter*	1917	Interurban
Androsoggin & Kennebec Ry.	Sabatius	1-200	"	1921	"
Augusta-Aiken Ry. & Electric Co.	Station No. 5	1-300	M-O Set*	1922	"
Aurora, Elgin & Chicago Ry.	"	"	Converter	Bldg.	"
Benton Harbor & St. Joseph Ry.	Portable	"	Converter*	1921	"
Butte Electric Ry.	South Butte	1-500	Converter	1918	City
Chicago, Aurora & Elgin R.R.	Warrenville	"	Converter*	"	Interurban
" " " " " "	Wheaton	1-1000	Converter	1923	"
" " " " " "	Bellwood	"	"	"	"
Chicago & Interurban Traction Co.	Monee	1-500	Converter*	1917	"
Chicago & Joliet Electric Ry.	Delwood Park	1-300	Converter	1919	"
Chicago, North Shore & Milwaukee R.R.	Kenosha (changed to 1000)	1-500	Converter*	1918-1923	"
" " " " " "	Beach	1-500	"	1917	"
" " " " " "	Lake Bluff	1-1000	Converter	1919	"
" " " " " "	Four Mile Road	1-500	"	1918	"
" " " " " "	Libertyville	1-300	Converter*	1919	"
" " " " " "	Ravinia Park	1-1000	Converter*	1921	"
" " " " " "	Carrollville	1-500	Converter*	1923	"
" " " " " "	College Ave	"	"	1922	"
" " " " " "	Minnetka	1-1000	"	Bldg	"
Christchurch Tramways	Cashmere Hills	1-300	Converter	1920	"
" " " " " "	Fendalton	2-300	"	1921	"
Cie Francaise, Thomson-Houston Co.	"	1-500	Converter*	Bldg	City
Cincinnati, Georgetown & Portsmouth R.R.	Wt. Washington	1-300	Converter	1923	Interurban
" " " " " "	Bethel	"	"	"	"
" " " " " "	Lake Allyn	"	"	"	"
" " " " " "	Georgetown	"	"	"	"
Cincinnati, Lawrenceburg & Aurora St. R.R.	Fernbank	1-200	"	1919	"
" " " " " "	State Line	"	"	"	"
Cleveland, Southwestern & Columbus Ry.	Chestnut	1-325	"	1923	"
" " " " " "	Pittsfield	"	"	"	"
" " " " " "	Hartners	"	"	"	"
" " " " " "	Mabees	"	"	"	"
" " " " " "	Penfield	"	"	"	"
" " " " " "	Chippewa	"	"	"	"
" " " " " "	Birmingham	"	"	"	"
" " " " " "	Madisonburg	"	"	"	"
" " " " " "	Leroy	"	"	"	"
" " " " " "	West Salem	"	"	"	"
Columbus Railway, Power & Light Co.	Nankin	"	"	"	"
" " " " " "	Haigh Ave.	1-500	"	1918	City
" " " " " "	Mound & Dana	"	"	1922	"
" " " " " "	Mound & Dana (2nd unit)	"	"	Bldg.	"
" " " " " "	North Car Barn	"	"	1922	"
Conestoga Traction Co.	Parkesburg	"	"	1919	Interurban
Consumers Power Co.	15th St.	1-1000	"	Bldg	"
" " " " " "	Atlas	"	"	"	"
Dayton & Western Traction Co.	Ohio Viaduct	1-500	"	1921	"
" " " " " "	No. 8	"	"	"	"
" " " " " "	New Westville	"	"	"	"
Dayton & Troy Electric Ry. Co.	Ebenexer	2-300	"	1920	"
Denver Tramway Co.	Corona St.	1-500	Converter*	1922	City
" " " " " "	East Division	"	"	1923	"
Des Moines City Railway Co.	20th & Clark	"	Converter	1916	"
" " " " " "	12th & High	"	"	"	"
" " " " " "	12th & High (2nd unit)	"	"	1923	"
" " " " " "	16th & Clark	"	"	1918	"
" " " " " "	Walnut & 2nd	"	"	1917	"
" " " " " "	Walnut & 2nd (2nd unit)	"	"	1923	"
" " " " " "	East 14th	"	"	1919	"
" " " " " "	Polk Blvd.	"	"	1918	"
" " " " " "	Fort Des Moines	"	"	"	"
Detroit Edison Co.	Alamont	"	Converter*	1923	Metropolitan
" " " " " "	"	1-1000	Converter	Bldg.	"
" " " " " "	"	"	"	"	"
" " " " " "	"	"	"	"	"
" " " " " "	"	"	"	"	"
Duluth Street Railway Co.	34th Ave. East	1-500	"	1919	City
" " " " " "	92nd Ave. West	1-1000	"	"	"
Elgin & Belvidere Electric Co.	Gilberts	1-300	Converter*	1916	Interurban
" " " " " "	Garden Prairie	"	"	"	"
" " " " " "	Union	"	"	"	"
Grand Rapids, Grand Haven & Muskegon Ry.	Spring Lake	1-500	Converter	1917	"
Hershey Cuban Railway	Elisa	2-500	"	1920	"
" " " " " "	Margot	"	"	"	"
Hershey Transit & Traction Co.	Elizabethtown	1-300	"	1922	"
Indianapolis & Cincinnati Ry.	Scottsburg	1-500	"	1921	"
Interurban Ry.	Breannan	1-300	"	1916	"
" " " " " "	Hyperion	"	"	1917	"
" " " " " "	Freight Line	1-500	"	"	"
" " " " " "	Oranger	1-300	"	1919	"
" " " " " "	Moran	1-500	"	"	"
" " " " " "	Beaver Valley	1-750	Converter*	1921	"
" " " " " "	Portable	1-500	Converter	"	"
Iowa Railway & Light Co.	Prairie Creek	"	"	1918	"
" " " " " "	Space	1-300	"	1921	"
Ironwood & Bellevue Railway Light Co.	Bellevue	"	M-O Set*	"	City
Kansas City Railways	Bluffs	1-500	Converter	1918	"
" " " " " "	Gallatin	1-1000	"	1919	"
" " " " " "	West Adams	"	"	1922	"
Los Angeles Railway Corporation	Mariposa	"	"	"	"
" " " " " "	Mariposa (2nd unit)	"	"	1923	"
" " " " " "	West 64th	"	"	"	"



GENERAL

RAIL

Automatic Railway Substations

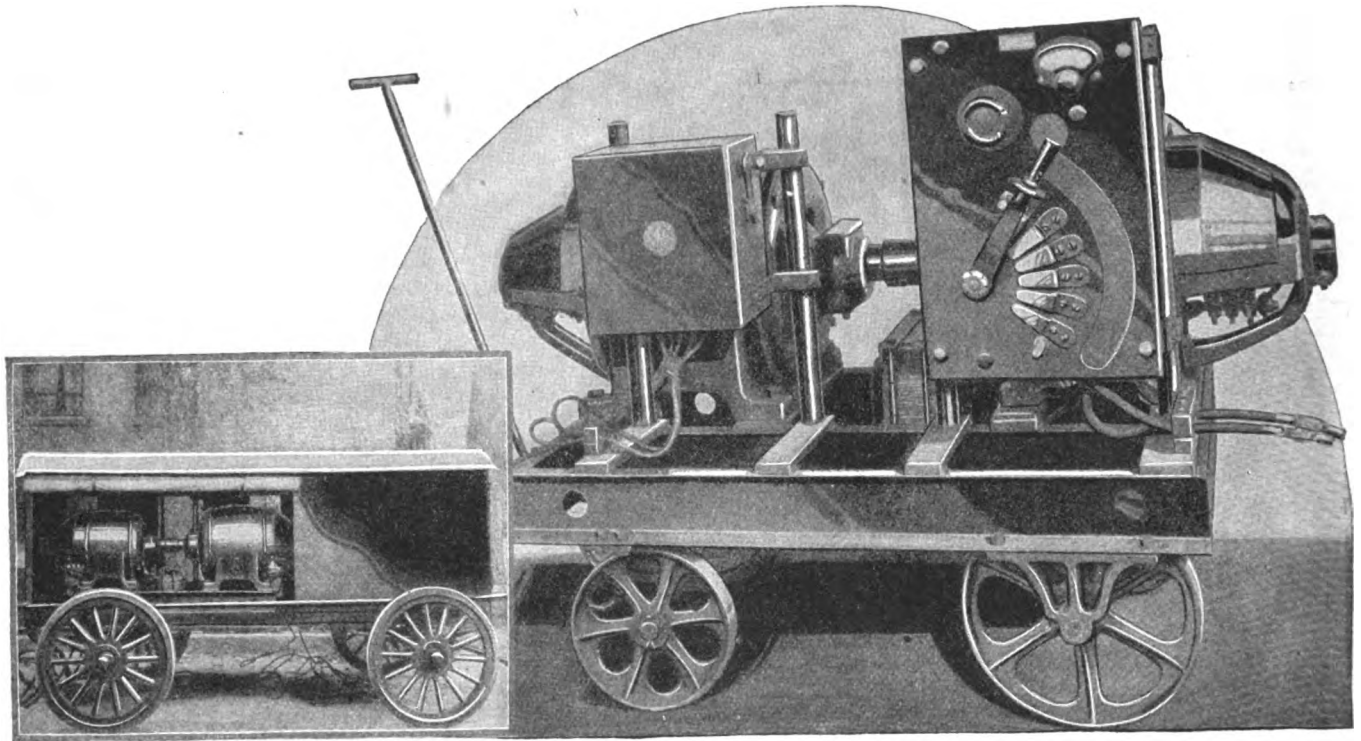
Company	Substations	Kw. Rating	Machine	In Operation	Service
				Bldg.	City
Melbourne Metropolitan Tramways		1-500	Converter*		
"	"	"	"	"	"
"	"	"	"	"	"
Mesaba Railway Co.	Hibbing, Minn.	1-300	"	"	"
Michigan Central Railroad	Detroit	1-2000	M-G Set*	1922	Interurban
Milwaukee Electric Railway & Light Co.	East Troy	2-300	M-G Set*	1920	Steam Road
Missouri Pacific Ry. (Coal Belt R.R.)	"	1-500	Converter*	1917	Interurban
Moroccan Railways	Kilo. 117.9	1-1000	M-G Set*	Bldg.	"
"	Skirat	2-1000	M-G Set*	"	Steam Road
"	Sidi-El-Aydi.	"	"	"	"
"	Moqman	1-450	"	"	"
New South Wales Government Rys.	"	1-200	Converter*	1916	Interurban
"	Narrabeen	1-450	"	1919	"
"	Abbotsford	"	"	1920	"
"	Ryde	"	"	Bldg.	"
"	Hunter Street (New Castle)*	2-1000	"	"	"
New York Central R.R.	110th St.	1-2000	M-G Set	1923	Steam Road
New York State Railways	Manlius Center (now Minoa)	1-300	Converter*	1917	Interurban
"	Williamson	1-250	"	1919	"
"	Canastota	1-300	Converter	1923	"
Niagara St. Catharines & Toronto	Niagara-on-lake	1-500	Converter*	1921	"
Northern Ohio Traction & Light Co.	Beach City	"	Converter	1919	"
"	Midvale	"	"	"	"
Northwestern Elevated R.R. Co.	Buena Park	1-2000	"	1923	Metropolitan
Oklahoma Union Railway Co.	Tulsa	1-300	"	1921	Interurban
Omaha & Council Bluffs St. Ry. Co.	Council Bluffs	1-1000	"	1919	City
Oregon Electric Railway Co.	Pirtle	1-500	Converter*	1923	Interurban
"	Wacoona	"	"	"	"
"	Lasen	"	"	"	"
"	Orville	"	"	"	"
"	Cartney	"	"	"	"
"	Tonquin	2-500	"	"	"
"	Moffatt	"	"	"	"
Pacific Electric Railway Co.	Wilmington	1-1000	M-G Set*	1919	"
"	Glauson	"	Converter	"	"
"	Hermosa	"	"	1920	"
"	Maple Ave.	1-1500	"	"	"
"	Van Nuys	1-750	"	1921	"
"	Hollywood	1-1500	"	1923	"
"	Perth	2-300	"	1922	City
Perth Tramways	Anacostia	1-500	Converter*	1916	"
Potomac Electric Co.	Portable	"	Converter	1923	"
Public Service Production Co.	Miller St.	2-1500	M-G Set	"	"
"	Norfolk St.	1-1500	"	"	"
"	Bloomfield	1-1000	Converter	"	"
"	Burlington	1-500	M-G Set	"	"
"	Portable	1-300	Converter	1920	Interurban
Sacramento Northern	Chico	"	"	1921	"
"	Salt Air	1-600	M-G Set	1919	"
Salt Lake, Garfield & Western	Salt Lake	"	"	"	"
St. Joseph Light, Heat & Power Co.	So. St. Joseph	1-300	M-G Set*	1920	"
"	Savannah	1-200	"	"	"
Shreveport Railways Co.	"	1-500	Converter	Bldg.	City
South African Railways	Diamana	2-2000	M-G Set*	"	Steam Road
"	Colenso (Pwr. Sta.)	"	"	"	"
"	Frere	1-2000	"	"	"
"	Escourt	3-2000	"	"	"
"	Wilbrook	1-2000	"	"	"
"	Lehigh Junct.	2-2000	"	"	"
"	Wegsels Nek.	"	"	"	"
"	Glencoe	"	"	"	"
"	Nottingham Rd.	1-2000	"	"	"
"	New Lidgettstown	2-2000	"	"	"
"	Cedars	1-2000	"	"	"
"	Broughton	2-2000	"	"	"
Tokyo Municipal Railway	"	1-500	Converter	"	City
"	"	"	"	"	"
Twin City Rapid Transit Co.	Concord	1-1500	"	1919	Metropolitan
Texas Construction Co. (Texas Terminal Ry.)	"	1-300	"	1922	Interurban
"	"	"	"	"	"
Toronto Hydroelectric Commission	North Toronto	1-1000	"	"	Metropolitan
"	Sunnyside	2-1000	"	"	"
United Electric Ry. Co., Providence, R. I.	Harmony	1-300	"	1918	Interurban
"	Oakland	2-300	"	"	"
United Railways Co. of St. Louis	Park Ave. & 39th St.	1-300	"	1922	Metropolitan
"	Franklin Ave.	1-2000	Converter*	"	"
"	Clark Ave.	"	"	"	"
"	Arsenal St.	1-1000	Converter	"	"
"	Newstead Ave.	2-1000	"	"	"
"	Maple Ave.	1-1000	"	"	"
Victorian Railways	Reservoir	2-1000	"	"	Steam Road
"	Mitcham	"	"	"	"
"	Springdale	"	"	"	"
"	Queensboro	1-1000	"	"	"
"	Rosanna	"	"	"	"
Wisconsin Light, Heat & Power Co.	Nennah	1-300	M-G Set*	1920	Interurban
"	Hazle Park	50	Converter	1923	"
"	Georgetown	1-50	"	"	"
"	Nuangola	"	"	"	"
"	Kislyn	"	"	"	"
"	Sugar Notch	"	"	"	"
"	Escopecock	1-500	Converter*	1921	"
"	Hittston	1-300	M-G Set*	1922	"
"	Wide Hollow	"	"	"	"

*Indicates purchase of G-E Control only.

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GENERAL ELECTRIC

New York, February 16, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, Editors

Volume 63
Number 7

**Chuck, Chuckety, Chuckety, Chuck—or
Clank, Clinkety, Clackety, Clank**

THE sounds made by cars passing over special trackwork tell much as to the kind of maintenance that is being done on the cars. Cars in proper condition pass over rail intersections with a "chuck, chuck" that imparts to the mechanically tuned ear an evidence of tightness of parts and good solid body and truck mechanism—a noise that is not especially unpleasant to hear. On the contrary, poorly maintained equipment clatters and clanks and rattles over the special work and joints and produces noises that are exceedingly annoying and wearing on the nerves. The trackwork may also contribute to the clattering noises if it is in bad condition with loose inserts and bent switch tongues. And such trackwork certainly shakes the equipment to pieces so it will rattle worse.

Sleeping in a hotel recently in a city where the latter kind of maintenance is manifestly practiced, the thought came to the writer that such rattling, clanking noises certainly make one think of the junk yard and perhaps contribute more than we realize to the impression part of the public has that the street car is obsolete.

Moral: Tighten up. There is no necessity for such noises. The rattles can be taken out by proper attention to maintenance.

Preheating and Slow Cooling Assist in Welding Large Castings

THERE is a broad application for the welding of cast iron in electric railway repair work if we learn how welds can be made successfully. The difficulties that have been experienced come from the fact that cast iron is naturally brittle and weak, and the application of welding heat at one point while the surrounding metal remains cold creates forces and strains that are likely to make the weld unsound. Even if the weld holds, cracks in other portions of the casting may occur. It thus becomes apparent that means must be employed to avoid this irregular heating and cooling.

That this is practicable and successful is shown by the practice used in the shops of the New York & Harlem Railroad for welding large conduit yokes, given elsewhere in this issue. It consists of heating the casting by gas flames beforehand and while the weld is being made and cooling the casting slowly and uniformly.

Results so far indicate that the method is very successful. Special equipment is used in this case. The welding stand has gas burners incorporated for the preheating, and two annealing ovens have been constructed and equipped with adequate facilities for handling the castings into and out of the ovens.

Some railways have reported satisfactory results in welding large iron castings by temporarily surrounding the castings with brick and then applying heat by gas torches or a charcoal fire. The weld is then made

rapidly and the casting is allowed to cool slowly before the bricks are removed. This rough method, of course, increases considerably the cost of the welding over that where special equipment is used, but special equipment may not be justified if only an occasional weld on a large piece is to be made. Methods may vary with different conditions, but preheating, rapid welding and slow cooling are essential to assured success.

The composition of the welding rods used is another factor in obtaining satisfactory results. Manufacturers of welding materials recommend the use of rods having not less than 3 per cent of silicon for welding iron castings. Silicon in sufficient quantity keeps cast iron soft and so the strains from cooling are reduced.

Merchant Has Vital Interest in Good Transportation

THERE have been so many cases in large and medium sized cities of the temporary stoppage of the trolley service through strikes or hostile political action that it is now possible with fair accuracy to predict what will happen. It was not so easy to do so in 1919, when the cars were withdrawn in Toledo and kept out of service for twenty-eight days. Then the possibilities—and limitations—of the jitney, the bus and the private automobile for conducting the local transportation of the city were not so fully known. Since the historic Toledo case, there have been a number of other instances of extended shut-downs, notably in Bridgeport, Des Moines, Saginaw and on the Public Service Railway in New Jersey. Now has come Akron.

In all of these instances it is found that the first members in the community to suffer material financial loss from the stoppage of the trolley cars are the large retail merchants. Of course the rest of the community also is greatly inconvenienced, but those who have to travel can make shift for some time without a great deal of discomfort, if the weather continues good, by using various nondescript public and private conveyances. In the meantime, those who do not actually have to travel stay at home. But the retail business in the center of the city is entirely dependent for its prosperity on good local transportation facilities between the center of the town and the residential districts. Most of the customers of these stores are women, and if they cannot reach the down-town store comfortably, a great many of them will buy their necessities from a neighboring store or mail order house and will postpone the rest of their purchases. Some may telephone their orders, but if the average department store had to depend for its business on its telephone sales, it would soon be obliged to close its doors.

Hence, it is significant that the retail merchants in Akron have already raised a strong protest against the

stupidity of the Mayor, which brought about the present unfortunate situation. The trolley cars in Akron are now being seen in their true light, i.e., as the means by which the commercial life of the city is kept going. Ultimately, of course, the cars will have to come back. Akron is too large a city to be able to get along with buses only. But when the cars resume service it will have to be under much more favorable conditions than existed before the present trouble.

Electrification at the A. I. E. E. Meeting

THE low availability for service of the steam locomotive was stressed as one of the principal problems of steam operation at the transportation meeting of the American Institute of Electrical Engineers, held at Philadelphia, Feb. 5. Figures presented showed that the availability factor of the steam locomotive is somewhere between 25 and 45 per cent on various roads, while for the electric locomotive the factor is, from Norfolk & Western service records, 85 per cent.

The time required for turning the engine at the end of the line, for the electric, is little more than that needed for uncoupling it from one train and coupling it onto another. The steam engine, on the contrary, has to be taken to the roundhouse, have its fire dumped, the water drawn off, the boiler washed out and minor repairs made. Then it must have its boiler filled and a new fire built before it can go out on the road again. While great steps have been made in recent years toward increasing the length of engine divisions, particularly by the use of oil-burning engines, and so reducing the frequency with which this turning operation has to be performed, still it takes a not inconsiderable portion of the total time, and so reduces the availability.

Another factor that was brought out at the meeting is that when the greatest demand comes on the system the electric locomotive is especially effective. The case of the New Haven Railroad, which has extreme peaks to handle in connection with football games in New Haven, was cited. Then each year every electric locomotive owned is in service and is kept running just as long as it is needed to handle the traffic. Such continuous service is not practical with the steam locomotive, and hence more steam locomotives are required to handle a heavy peak than electric. Similarly, the annual heavy traffic season can be handled under electric operation with comparatively less investment in locomotives than with steam, because the electric moves the trains faster and is tied up for repairs and inspection for a so much smaller part of the time. In other words, the extra investment required to handle peaks, both seasonal and special, is substantially less for electric.

There seems to be a feeling on the part of some steam railroad men that the electric locomotive still is an untried machine, and that it is necessary to electrify an entire main line division before any really conclusive evidence can be obtained for or against it, as practically all accounting is by divisions only, with no segregation of the electric from the steam where both are used on a division. The figures that were cited as to what electrics already have done do not bear out this contention. On the Norfolk & Western, for instance, the electric locomotives have done more than the most modern steam operation ever was able to do. They have moved a greater tonnage per train and per day,

have done it with less delays and failures on the road, and at a lower cost. Furthermore, the electrified section, which under steam operation was the limiting point of the system, now has ceased to determine the capacity of the road. On the Chicago, Milwaukee & St. Paul installation many of the limitations due to heavy grades, tunnels and bad coal have been eliminated, so that the capacity of that road is materially greater than before electrification, particularly in winter.

If the attitude of the steam men is to be that the case for or against electrification cannot be proved until an entire division is electrified, it would seem that there will be no real progress until some railroad has the foresight and the courage to go ahead and make such an installation. Are railroad men going to leave it to Henry Ford to show the way on the D. T. & I.? There are numerous divisions where electrical engineers estimate that large savings can be made. One was cited at the meeting where, after figuring charges of every sort, a profit of 15 to 20 per cent could be shown on the investment. Certainly with such a margin the risk cannot be very great.

Nor is it necessary to wait until a perfect locomotive is developed for electric service. The only way to learn to swim is to jump into the water. Experience covering nearly thirty years has developed a number of types of electric locomotives good enough so that they have given more than satisfactory service under nearly all conditions of traffic. High-voltage, low-voltage, alternating-current, direct-current locomotives can all be used.

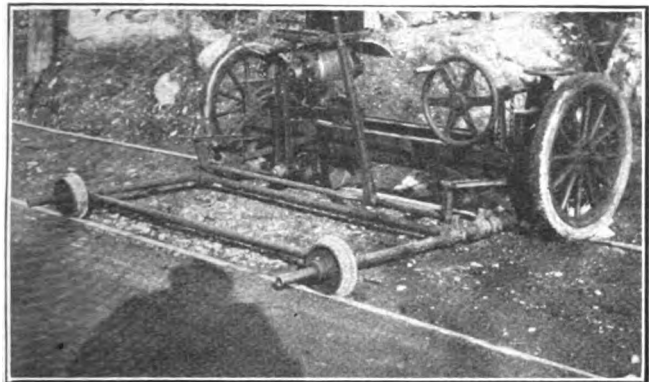
Altogether, it seems that the engineers have been prone to hold the penny so close to the eye that the sun is obscured. Small details and cost figures pertaining to the electrified division only seem to have kept them from seeing what has been pointed out, namely, that the main value of electrification is the increased use of the entire railroad plant and the higher earning power of the system as a whole which it makes possible.

It Pays to Lay Out Maintenance Work in Advance

IT STANDS to reason that much more can be accomplished by a given expenditure of time and effort when the work is carefully laid out in advance and is conducted along a logical plan of procedure. Sad to relate, this practice is not followed on all electric railway properties. As one maintenance engineer remarked to the writer, "Why worry and waste effort before you know that anything is wrong?"

One large Eastern property followed this haphazard practice for years, and not until it had passed through a receivership and a reorganization was the fallacy of the procedure recognized. Nevertheless, that much can be accomplished along these lines is well shown in the article by Frank B. Walker elsewhere in this issue.

Much of the gain is not from the improved equipment alone, but from the careful planning of the season's work well ahead of time, so that each machine could be in use for the longest period possible, and the men could be kept working steadily. This meant that a smaller amount of equipment had to be purchased and a smaller force hired. With the smaller number of men to train, of course they attained expertness and were able to do more and better work. The gain to the company has been very considerable, not only in cost but in performance, and through that, in improved public esteem.



Universal Rotary Grinder and Reciprocating Grinder at Work on Eastern Massachusetts Street Railway

Applying Quantity Production Methods to Maintenance of Way

Construction Forces Organized According to Manufacturing Practice to Obtain Intensive Use of Track Machinery on Eastern Massachusetts Street Railway — Selection of Proper Equipment for Diversified Jobs Is Important—School for Training Men to Do More and Better Work Found Helpful to Economical Maintenance

By Frank B. Walker

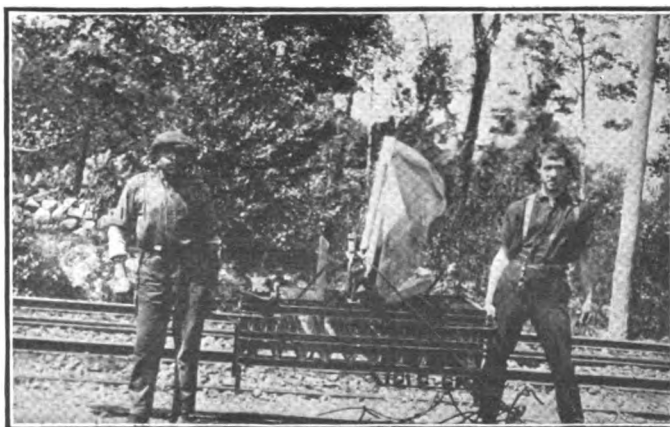
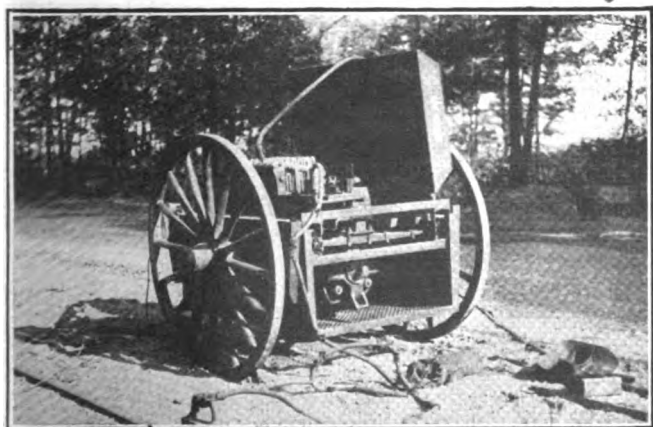
Chief Engineer Maintenance of Way, Eastern Massachusetts Street Railway

IN THE rehabilitation and maintenance of its 680 miles of track, the Eastern Massachusetts Street Railway has recently adopted machinery and methods which have greatly expedited the handling of the work. Substantial savings in labor and material have been accomplished.

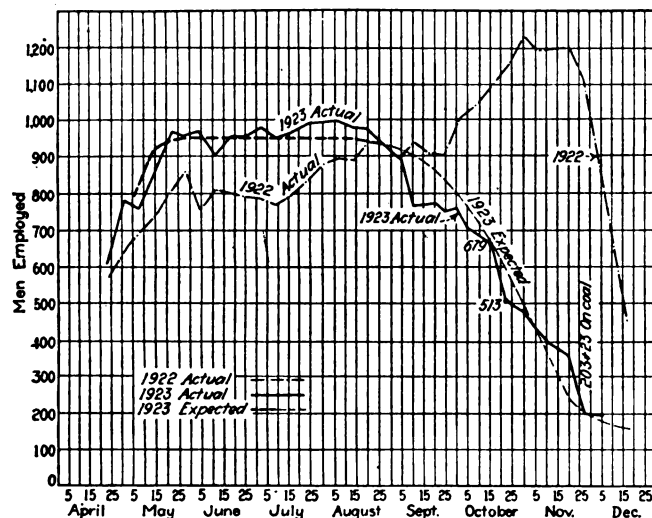
When the public trustees took over the property in 1919 the track and roadbed were in poor condition as a result of long-deferred maintenance during the war and during the period when the company was in receivership. A comprehensive plan of way betterment was started late in the summer of 1919. The carrying out of the program has involved the organization of the work on a divisional basis, the acquisition of various types of track equipment, and the thorough training of the departmental personnel in the use of improved equipment for track repairing. Close attention to enlarging the force in the spring and summer and reducing it again in the fall, as shown on an accompanying chart, has greatly increased the efficiency of the work.

In order to keep machinery going all the time, several things are necessary. First, the amount of work to be done must be known in advance. The Eastern Massachusetts Street Railway works on a budget system. From the general budget the track department calculates its various jobs and details the items of work to be done. The number of men to be employed and the amount of material to be purchased must be determined, and a definite schedule is necessary in order to assign machinery to the several divisions and to prepare a working program for this equipment. After this has been done, the various jobs are formally and systematically authorized. Charts are prepared showing the progress expected during the season of different items of work, such as seam welding, joint grinding and surface welding.

A close study is made of the progress of each division, and when one division has failed to keep up to the anticipated rate, inquiries are immediately started to determine the difficulty. It is found occasionally that



The Company Used Two Types of Welders, the Dynamotor Type, at Left, and the Resistance Type, at Right



Labor Chart for 1922 and 1923

work has not been opened up in sufficient time to keep up the anticipated rate; sometimes material has not been ordered or delivered in time, machinery may have broken down, or production may have fallen off for some other reason. However, the department accepts no alibis for failure of production. Even labor conditions or machinery failures are not always considered adequate excuses.

The rate of production is set high, but certain allowances are made for unexpected contingencies. It has been found in general that if the men directly in charge of the work correctly anticipate their wants so far as ordinary material is concerned, production can be kept at high speed. Ratings are given by the engineering department to several types of machines. For example, in seam welding of T-rail with 24-in. joints, a rate of ten joints per welding handle per nine-hour shift is expected. With 30-in. joints the rate is nine, and with 36-in. joints it is eight. On girder rail, the rate of welding per handle per shift is seven joints when they are 24 in. long, six joints when they are 30 in. long, or five joints when they are 36 in. long. In grinding, the schedule calls for eighteen surface

welded joints or thirty-six other joints per grinder for each nine-hour day.

Unless a definite daily quantity of work is assigned, the desired production for the season cannot be obtained, nor can it be determined whether or not gangs are working efficiently. The question has sometimes been asked, why were only a few items selected for this quantity production? The answer is that in repairing, overhauling or reconstructing a track, the last thing done is the joint work. Those items, such as joints, which are selected as standards for measuring production, represent a finished product. It is necessary for the forces to put in ballast, do the lining and surfacing, ditching, tie renewals and all other miscellaneous work, except paving, before the joints are finally finished.

Complete reports are prepared by each division for the general offices twice a week during the construction season, detailing the work done and also showing the amount per half week and the total to the date of the report. Where slowness appears in a particular job after an analysis, special attention is given by sending out instructors, or in some cases engineers, to inspect the work closely. In other cases of more important problems, the chief engineer gives his personal attention to bringing up the quantity of work.

Progress charts are kept, showing for any given date the number of joints welded up to that time and the number ground. On these charts are shown also curves for the estimated rates of progress, so that it can be seen at a glance whether or not the work is proceeding according to schedule. This close supervision is necessary in order to accomplish such a large amount of maintenance work over scattered divisions.

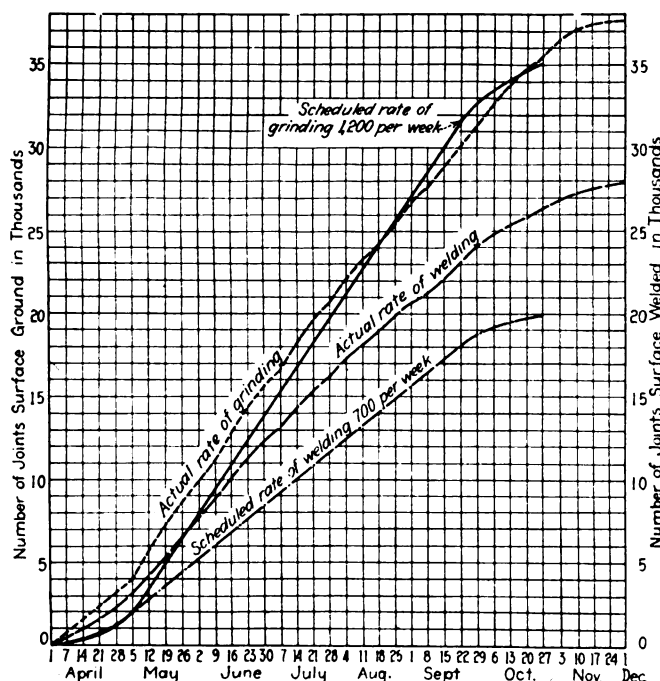
IMPORTANCE OF HAVING THE RIGHT MACHINERY

To keep the track maintenance equipment continuously in use during the entire season has been the aim of the railway. It is the policy to purchase all machinery necessary to do the work properly and efficiently, provided such equipment can be used throughout the entire working season. Machinery, even though of proper design, is of little value if it can be used only a small portion of the time.

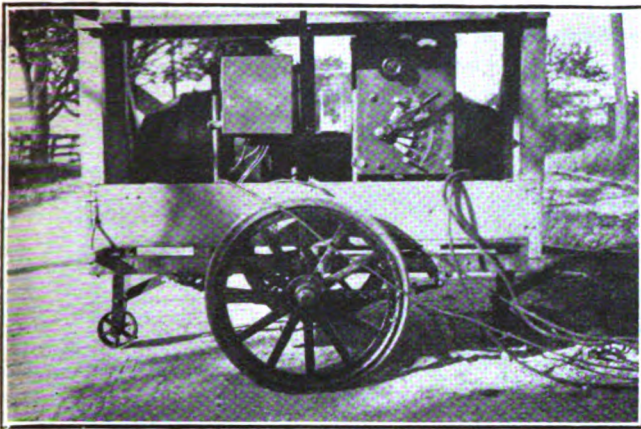
Equipment used by the track department must be portable, rugged and simple, not only in its operation but in its maintenance. It must also be well protected against the weather and should have parts which can be readily detached, covered, or fastened on so securely that they cannot be stolen, as the machinery must be left along the roadside in many instances. There is room for still further development of portable track machinery. Manufacturers should not attempt to adapt shop equipment for use of the track department without being sure that such machinery can stand the extra heavy service brought upon it by use under all conditions of weather, sand and dust storms, and being operated by men who are not mechanics.

Due to the wide separation of jobs on the system, which covers both city and country areas north and south of Boston, the company did not purchase the larger pieces of track maintenance equipment available on the market. Such purchases would have resulted either in excessive investment or in too much idle time and difficulties in meeting local demands for the service of particular large units.

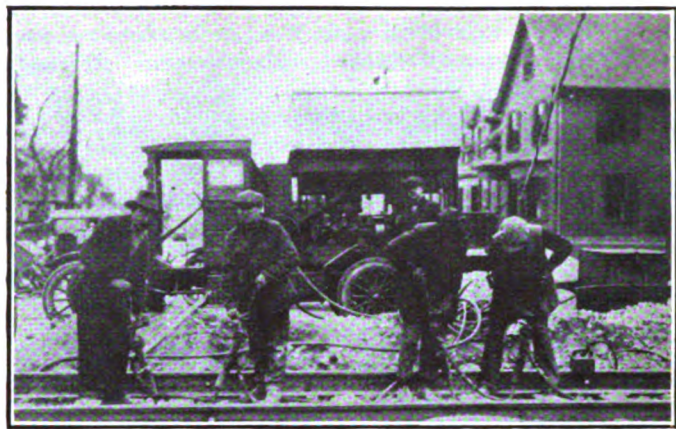
The gradual purchase and installation of track maintenance machinery followed recommendations by the engineering department after more or less extended research and experiment, working out the machine use



Scheduled and Actual Joint Grinding and Welding, 1923



Shop Welder on Wheels for Outside Use. Tool Box on Roof



Track Air Compressor Mounted on a Ford Truck

through a system of reports, and including sending out instructors and conducting a winter track school.

The equipment finally purchased and in use on the Eastern Massachusetts Street Railway includes twenty-four rail joint seam welders, of which twelve are of the Rail Welding & Bonding Company Type WW, six are the same company's Type B, five are General Electric shop welders mounted on trailers, and one is a Westinghouse shop welder also mounted on a trailer.

All these machines with the exception of the Type WW are limited by their capacity to the use of one welding handle. The capacity of the latter is sufficiently great to permit two welding handles, so that there are thirty-six welding handles with twenty-four machines. All of these seam welders are of the so-called "dynamotor" or "motor-generator" type, permitting reversal of the polarity of the arc. The surface welders used by the company are all resistance machines of the direct polarity type and consist of ten Indianapolis welders, five Erico welders and nine Ajax welders. For grinding the joints there are twenty-four Universal joint grinders and six Seymour "Midget" grinders, as well as ten reciprocating grinders for grinding corrugated rails.

Vertical rail benders are used to a considerable extent, forty-seven having been made by the company.

Eighteen electric tie tampers of the Jackson type, having 4 tamper units each, are used. Compressed air is provided by two Ingersoll-Rand portable compressors, each mounted on a Ford chassis. These are used for tie tamping and operating concrete breakers.

Other equipment used includes a Racine electric rail saw, a "Nut cracker" clamp designed by the company for holding plates in place while welding, an electric brush for cleaning rail joints, and an electric hammer

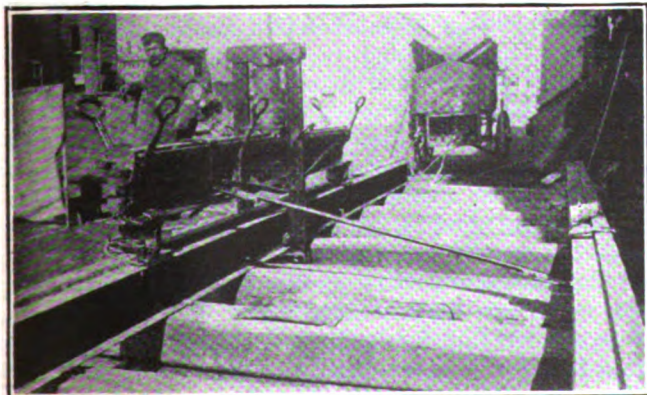
for cleaning rail joints. These two latter machines were used for experimental purposes.

The company also has twenty-four acetylene cutting torches, forty track drills and various other small units of the usual type.

The theory upon which the engineering department works is that poor trackwork is just as likely to be the fault of the supervisory forces as it is to be the result of incompetence or unwillingness on the part of the workmen. Old methods of doing trackwork were apparently satisfactory up to a few years ago, there having been few changes for a number of years. More recently, however, maintenance methods have been much modified by the development of certain types of machinery such as welders, grinders, rail benders, mechanical tampers, etc.

It is hardly to be expected that foremen and trackmen should be familiar with the newer methods and be able to get the desired results without special instruction. On the Eastern Massachusetts the training of these men has been combined with the instructions of the supervisory forces, including managers, superintendents, engineers and roadmasters, as well as foremen, sub-foremen, welders, grinders, bonders, trackmen and laborers. Instruction was started at the top, working downward through the various grades to the men with picks and shovels.

A most successful school for track forces was conducted under the direction of the chief engineer during the winter of 1921-1922. Subjects were classified under the headings of bonding and joint welding, surface welding and grinding, special work drainage in open track, tie renewals and joint repair work, construction of city tracks, and reports. The classroom was equipped to accommodate about twenty-five students, with facili-



Vertical Rail Bender Used by the Eastern Massachusetts Street Railway



Testing Rail Joints with 36-In. Steel Straight Edge. The Card Indicates a Cup of 0.005 In.

TABLE I—MACHINERY UNITS AVAILABLE SEPT. 20, 1923, AND WORK COMPLETED DURING YEAR TO DATE.
THE UPPER FIGURES SHOW THE WORK DONE DURING THE PREVIOUS WEEK AND THE LOWER FIGURES ARE FOR THE YEAR TO DATE
The enlargement of the track force in spring and summer is a feature of quantity production methods on the Eastern Massachusetts Street Railway

	Force	Jobs Working	Auth. Open and Working	Welders Seam	Welders Surface	Joints Welded Seam	Joints Welded Surface	Grinders Working U. R.	Grinding Completed Joints	Grinding Completed Feet of Rail	Electric Tamperers Working	Ties Hand	Tamped Mach'y
Chelsea.....	64	5	1 working 3 open	2	1	29 1,231	54 1,341	1 0	112 2,267	0 12,847	0	0 472	0 10,057
Melrose-Woburn.....	79	4	2 working 4 open	1	2	12 389	59 2,480	2 1	54 2,462	144 17,458	0	147 2,843	0 459
Lynn.....	78	11	8 working 36 open	3	1	47 1,062	26 1,447	1 1	26 2,578	319 35,026	2	0 758	210 9,699
Salem.....	52	6	4 working 14 open	2	2	0 1,659	60 2,141	2 1	78 4,219	193 11,118	1	167 5,021	120 7,083
Lowell.....	98	4	7 working 13 open	2	3	38 3,003	93 3,438	2 0	93 3,607	0 5,270	2	29 2,883	212 12,735
Lawrence.....	48	5	3 working 4 open	1	1	16 1,104	4 1,000	1 1	12 1,489	525 20,375	1	30 2,440	240 4,690
Haverhill.....	14	2	1 working 4 open	1	1	0 329	11 813	1 0	11 971	0 0	0	8 6,152	0 1,750
Milton.....	2	1	0 working 0 open	0	0	0 0	0 0	0 0	0 0	0 0	0	0 1,070	0 0
Norwood.....	8	0	0 working 1 open	0	0	0 6	0 6	0 0	0 414	0 0	0	10 1,089	0 0
Hingham.....	0	0	0 working 0 open	0	0	0 0	0 0	0 0	0 0	0 0	0	0 399	0 1,206
Weymouth.....	20	2	1 working 2 open	1	0	8 43	0 116	0 0	0 18	0 0	0	78 248	0 330
Quincy.....	48	8	6 working 8 open	0	0	0 413	0 621	0 1	0 644	335 16,540	1	125 3,455	250 3,897
Brockton.....	137	9	6 working 16 open	4	3	60 413	120 6,294	3 1	121 6,645	510 13,357	3	130 7,418	151 8,294
Taunton.....	27	2	2 working 3 open	0	1	0 1,078	50 204	1 0	45 447	0 0	0	0 2,000	0 5,158
Fall River.....	107	5	5 working 18 open	2	2	31 1,272	51 1,874	2 1	85 2,461	280 12,827	1	275 10,279	300 11,805
Total.....	782	64	46 working 126 open	19	17	241 13,490	528 21,775	16 7	637 28,222	2,306 144,818	11	949 47,037	1,483 77,163

ties for showing lantern slides. The school was in session five days a week, beginning late in December and running to the latter part of February. Sessions lasted five hours each day, half of the time being assigned to illustrated lectures by the engineering staff or occasionally by manufacturers' representatives.

The afternoon sessions were devoted to the actual demonstration of track maintenance machinery, which was set up in the shop for instruction purposes. The shop contained sections of both sand-ballasted and rock-ballasted track so that seam welding, surface welding, grinding, tamping and other operations could be carried out on full-sized track sections. About 125 men went through the school. Classes were divided according to occupations, and attendance for not more than one day per week was required of any one individual. Many valuable suggestions bearing upon working methods in the field were received from those attending the school. The sessions were repeated during the winter of 1922-1923 and will be resumed again this year.

The railway has kept records of the amount of work of various kinds done for several years. The tremendous volume of such work may be judged from the fact that 137 miles of paved track or 47 per cent of the

total paved track mileage have been welded. In unpaved territory 211 miles or 66 per cent of the total unpaved trackage have been welded. For the system as a whole 348 miles or 53.5 per cent of the total of 650 miles have been welded.

An analysis of the welded joint failures may be of interest. By the end of 1922 there were 77,128 seam-welded joints, of which, in the years 1921 and 1922, there were 265 broken joint plates or 0.34 per cent, 195 broken rails or 0.25 per cent and 120 broken welds or 0.15 per cent, a total of 580 failures or 0.74 per cent in the two years. By the end of 1923 there were 89,969 seam-welded joints, of which, in the years 1921, 1922 and 1923, there were 523 broken joint plates of 0.58 per cent, 320 broken rails or 0.35 per cent, and 131 broken welds or 0.15 per cent, a total of 974 failures or 1.08 per cent in the three years. For this work the organization of the engineering department has included a chief engineer, a return circuit engineer in charge of welding, bonding and machinery, three division engineers in charge of construction and maintenance, one assistant engineer and three men doing instrument work, two welding and grinding instructors, one chief clerk and one stenographer.

In spite of the vigorous attempts which have been made to accomplish a large volume of work, efforts have not been spared to produce at the same time a good quality of work. It has constantly been impressed upon the men by teaching in the school, by the criticism of the instructors that quality must not be sacrificed for quantity. It has been found on the whole that where men failed to produce quantity they usually failed also to produce quality. Where they work, however, they do good work. The workmen have been encouraged more than they have been criticised. It has

TABLE II—SUMMARY OF TRACK MAINTENANCE WORK DONE BY EASTERN MASSACHUSETTS STREET RAILWAY

	1921	1922	1923	Total
Joints welded.....	34,822	37,415	17,841	90,078
Surface welding.....	19,591	26,654	27,713	73,958
Joints ground.....	26,182	59,559	37,688	123,429
Linear feet of corrugated rail ground.....		175,426	165,899	341,325
Ties tamped with electric tampers.....			92,000	92,000
Miles of track rebuilt.....	29.4	16.9	33.5	102.4
Miles of track overhauled.....	80.5	51.1	69.9	244.3
Ties installed.....	103,996	69,252	115,259	388,666
Pieces of special work installed.....	479	257	374	1,620

been the theory that the men want to do good work and failed in doing it only through lack of proper instruction on the part of their superior officers. This theory in the main has proved to be correct. In the few cases where men were found unwilling to work the company adopted the policy of quickly dispensing with their services.

When the very poor condition of the track existing in 1919 is considered, the tremendous volume of work

done can be realized. As a result, riding has become more comfortable, noise has been eliminated, the expense of car maintenance has been reduced, as well as that of track maintenance, and derailments, particularly those due to the defective track, have become infrequent. This has not been accomplished without the expenditure of a great deal of effort on the part of the executives, but it is felt that the results have more than justified the efforts.

Welding Large Iron Castings with the Oxyacetylene Torch

The New York & Harlem Railroad Is Successfully Welding Conduit Yokes—The Castings Are Heated with Gas While They Are Being Welded and Afterward Cooled Slowly in Annealing Ovens—Cost of a Reclaimed Yoke One-sixth the Price of a New One

ADEPENDABLE autogenous weld on a large iron casting is extremely difficult to make, due to the fact that the metals in the casting adjacent to the weld are melted by the local heating. When this source of heat is removed, the molten iron solidifies quickly, owing to the large body of cold material in the casting around the portion melted. Naturally, that portion of the metal which has been liquefied and then cooled quickly is very hard, and uncombined carbon is brought to the surface. This carbon has a deteriorating effect on the weld, acting as a separator between the casting and the deposited metal. The volume of the metal at the weld decreases considerably as the weld cools, the linear contraction of cast iron while cooling from its melting point to ordinary room temperature being approximately 1 per cent. This means that each foot of length contracts approximately $\frac{1}{8}$ in. It is evident that severe stresses are set up by this contraction of the welded metal, and as a result either the casting soon breaks again or the weld is pulled apart.

A process to obviate this difficulty in the welding of cast iron has been developed by the New York & Harlem Railroad in connection with the reclamation of the large yokes which are used in the underground conduit construction in New York City. These frequently break after a number of years of service, and in the past have been thrown away and replaced. The development of the welding process has made it possible to reclaim practically all of them and restore them for further use. The description of the method of reclamation indicates how this has been accomplished.

CLAMPS HOLD YOKES IN POSITION

As these castings are very large, weighing from 500 to 525 lb., it has been found desirable to provide for economical handling during their removal from the street and while being worked on in the shop. Accordingly, a variety of clamps has been prepared, the proper ones being placed on a broken casting before it is removed from its position in the street. This clamps the broken parts securely together. A top plate with a U-shaped projection is bolted to the top of the yoke, so that a chain and tackle can be hooked in for handling. An accompanying illustration shows one of these large yokes with a clamp attached to hold the

broken parts together, and also the plate with a chain attached for lifting. A number of other clamps which are used in this work are also shown in the illustration. After the broken yokes have been clamped together, they are transported on cars or trucks to the shop where the welding work is done. Clamping the various parts together before they are removed from the street reduces the labor in handling, and there is no danger of any part becoming lost. Where castings have several breaks in half the yoke, it is cut in two by the carbon arc and the good half is then welded to another similar good half from another yoke.

PREHEATING AND ANNEALING ARE ESSENTIALS OF THE METHOD

In order to make a successful repair on a cast-iron piece of such large section, the company has found it necessary to provide for heating the casting preparatory to the welding operation, and to arrange for slow cooling so as to anneal the entire casting. To facilitate handling and prevent cooling of the metal between the welding process and the annealing a welding room has been provided immediately in front of the annealing ovens with three sides inclosed. The welding stand is constructed of 1-in. pipe, with its top about 30 in. from the floor. This stand is provided with three special gas burners. Each burner has a 1-in. supply pipe, bent to a circular form, to which short uprights of $\frac{3}{4}$ -in. pipe are welded. Each of these upright pipes is beveled slightly, and has small holes in the top to permit the correct amount of gas to flow. When the yoke is in position one of the three burners is underneath the center and one under each end. With this arrangement the yoke can be heated by the gas flame, no matter where the breaks may be, and without the necessity of changing the position of the yoke on the welding stand after it has once been placed. One of the illustrations shows a yoke in position on the stand with the operator cutting out a V-shaped groove in the break preparatory to welding.

Oxyacetylene is used for cutting and is also used for the entire welding process. Provision, however, is made for electric welding and also for cutting by the carbon arc if desired.

In carrying on the work the burners underneath the yoke usually are lighted at the time that the cutting

commences, and by the time that the cutting and welding are finished the yokes are heated. The flame can then be reduced to a size just sufficient to keep the casting hot, should the welding extend over a considerable period.

Two ovens of brick have been constructed, each of which is 6 ft. 3 in. wide, 10 ft. 4 in. long and 6 ft. high, providing sufficient room for four yokes. Four gas burners are provided at the bottom of each oven. These burners consist of 1-in. pipe running the length of the oven and perforated with small holes to permit the flow of gas. The same blower that serves the weld-

by the crane as required. The upright column for the crane is made of old T-rail with an I-beam for a jib. On this jib a 1-ton Yale block travels. The upright is trussed with a tension member at the back. An accompanying illustration shows this jib crane.

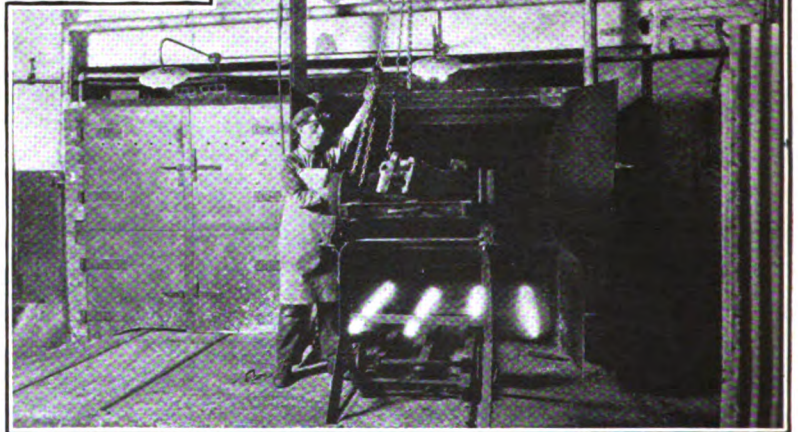
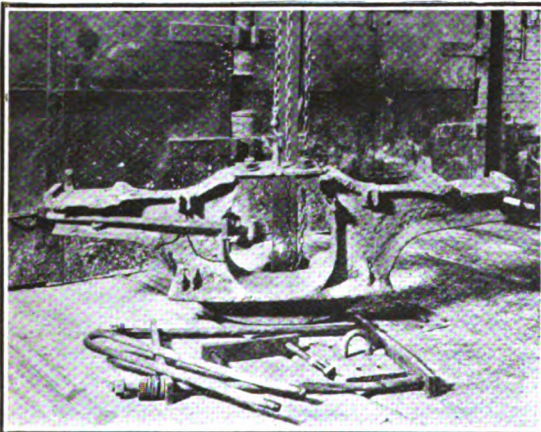
Each oven has two tracks, one above the other, so that the castings can be loaded on a small car and rolled into and out of the ovens. The bottom track extends outside on a platform in front of the ovens. Extensions are provided for the upper tracks by a movable framework and rails. An I-beam extends across the center of the oven, providing support for one end



Top, left, cutting out grooves in a yoke preparatory to welding, with yoke in position on welding stand.

Below, at left, broken yoke held together by clamps. Other clamps used are shown in the foreground.

Below, right, placing a yoke on a car for insertion in the cooling oven.



ing stand also supplies air for the burners in the ovens, and galvanized-iron pipes conduct it to the regulating valve. Two sheet-iron doors are provided for each oven. Each door has five 1-in. holes as a safety precaution in case the gas pressure should be reduced so that the flame would go out.

The burners in the oven are lighted a sufficient time in advance so that the oven is hot when the castings are ready to be inserted. After castings are placed in the oven the gas is turned off and the oven is then allowed to cool slowly. The oven will stay hot for approximately sixteen hours. In practice, however, castings are cooled in a minimum of six hours.

A jib crane has been installed in front of the cooling oven to facilitate handling. This serves the welding stand and the oven, and it also is used to unload or load the yokes on or off the cars and trucks, which can be run alongside. The yokes are handled by the jib crane from the cars to a storage space provided at the side of the oven front platform. From there they are picked up and placed in position on the welding stand

of each of the rail extensions, while an angle-iron stand is provided to support the other ends. Two short lengths of rails are used, dowels being provided so that the rails are placed in exact position and are firmly held when once installed. With the extensions in place the car can be rolled outside so that castings can be handled onto or off the car directly by the use of the jib crane.

Air pressure for the burners of the welding stand and also for the burners in the oven is provided by means of a blower installed on a platform attached to the wall above. Air is conveyed from the blower to the burners by 4-in. galvanized pipes. The admission of gas and of air from the blower is regulated by valves placed at the welding stand, convenient to the operator. The switches, fuses and starting box for the blower motor are installed on the wall adjacent to the welding stand.

Since this welding equipment has been installed the average cost for welding a yoke has been \$6.25, and this is less than one-sixth the cost of a new yoke.

Public Service Testing Buses

Detailed Specifications Have Been Adopted for Trial Runs by Fifteen Different Types of Buses

AS A PRELIMINARY to determine the extent to which it will engage in the bus business as supplementary to its electric railway service and the type of buses to use, the Public Service Railway of New Jersey is conducting an extensive system of tests on buses. Fifteen buses have been selected for these tests, some of which have been completed. The list of buses and scheduled dates for the tests follow:

Chicago single-deck (Yellow Coach)	Jan. 14
Chicago double-deck (Yellow Coach)	Jan. 16
Fifth Avenue single-deck.....	Jan. 18
Fifth Avenue double-deck.....	Jan. 21
International Harvester	Jan. 22
Fageol (street car type).....	Jan. 25
Reo	Jan. 28
Garford	Feb. 1
Federal	Feb. 4
Philadelphia double-deck, Mitten-Traylor.....	Feb. 6
White	Feb. 10
Mason (Durant)	Feb. 13
Pierce-Arrow	Feb. 15
Day Elder	Feb. 18
Mack	Feb. 20

In addition to the performance tests outlined below, some of these buses are being tried out in regular passenger service at Plainfield and Camden. Those at Plainfield are two Fageol, three Fifth Avenue type J and four Reo type F. Those at Camden are twenty-one White, models 50 and 50A.

The performance tests are being conducted over a test loop, 11.2 miles in length, in Newark, Orange, West Orange and East Orange, combining opportunities for level running and hill climbing. The paving includes rough cobble, smooth cobble, brick and asphalt. In addition, a short straight level section of road with asphalt paving in Newark will be used to determine the maximum rate of acceleration for each bus. An outline of the specifications for the performance tests, which are being conducted under the name of the Public Service Transportation Company, follows:

Outline of Performance Tests of Motor Buses

Object. The object of the tests is to determine (1) the ability of each make or type of motor bus to perform under a wide range of both normal and maximum service conditions; (2) the relative abilities of motor buses in a given service; and (3) the character of work for which each make or type of motor bus is best suited.

Conditions. Agents will be requested to submit for test, upon a prearranged schedule, one or more gasoline motor driven buses of the so-called street car type provided with one front or rear entrance-exit door and cross and longitudinal seats carrying from 17 to 67 seated passengers. The equipment submitted shall be standard in all respects, fitted with stock parts, and motored and geared as best suits the agents.

Agents are requested to participate in the tests of their own buses and to offer such suggestions as to the conduct of tests as will assist in developing and demonstrating the performance and characteristics of buses; but such changes in or additions to the tests specified herein as may be adopted shall apply equally to the tests of all buses submitted. Agents will not be permitted to participate in the tests of competitive buses, nor will they have access to the results thereof.

Each agent is requested to familiarize himself with the tests and routes outlined herein and to have his equipment in the best possible normal operating condition prior to the tests. Ample opportunity will be given for this purpose. No changes or adjustments of equipment will be permitted

during the series of four tests outlined herein. Changes made necessary by the failure or abnormal performance of equipment may be considered cause for the running of a new series of tests.

All tests of an individual bus will be made during one week day, between the hours of 8 a.m. and 6 p.m., if possible. Decision to start or stop buses shall rest with representatives of the Transportation Company.

Agents shall furnish signed statements giving information relative to each bus prior to the tests, as follows:

(1) Diagram showing engine torque and horsepower curves, (2) cylinder bore and stroke, (3) cylinder volume, (4) normal revolutions, (5) maximum safe revolutions per minute, (6) transmission gear ratios, (7) differential or rear axle gear ratios.

Agents shall equip each bus submitted for test with a calibrated and certified speedometer. This may be installed either temporarily or permanently.

Agents shall make provision for the insertion of a thermocouple in the top radiator connection to the engine by drilling a $\frac{1}{8}$ in. hole in the top radiator connection below the minimum water level and tapping with a $\frac{1}{8}$ in. S.A.E. thread. The hole so made shall be closed with a screw plug, pending the insertion of the thermocouple by representatives of the Transportation Company.

Agents shall provide means for easily and rapidly draining the main gasoline storage tank, vacuum tank and all connecting piping up to the carburetor.

1. SCHEDULE AND ECONOMY TEST

Each bus submitted for test will be operated for at least four trips over an established test loop about 11 miles in length, upon which will be found nearly all conditions of traffic, grades, street surfaces and other elements common to city and suburban bus operation. Description of the route and map is attached.

Stops will be made at established points averaging about eight per mile, and the time of each stop will be 7 seconds unless traffic conditions require other periods.

Time will be recorded at each start and stop, that is, at the beginning and end of each of the eight individual runs per mile.

Speed will be recorded and will be limited to a maximum of 30 miles per hour.

Gears used during each run will be recorded.

Temperature of the engine cooling water will be recorded during the progress of the test.

Weight of the bus and its load will be measured during the progress of the test. The passenger load, including observers, but excluding driver, will be about 60 per cent of the normal rated seating capacity. Other loads may be used on later tests.

Tire pressures will be measured at the beginning and end of the test and adjusted to the tire manufacturer's recommended values for the sizes of tire used and the weights carried.

Gasoline consumption will be measured. The fuel system will be drained at the beginning of the test and a measured quantity of "Standard" gas, of known gravity, will be supplied by the Transportation Company at the expense of the agent. The quantity remaining at the end of the test will be measured.

Riding quality, vibration, side sway and other elements affecting the comfort of passengers and driver will be observed and recorded.

Weather conditions and condition of pavements will be recorded.

Traffic conditions will be recorded.

Driver shall be furnished by the agent for two of the four trips, while one competent driver in the employ of the Transportation Company will operate each bus for the two remaining trips.

Observers will be furnished by the Transportation Company. Each observer will perform the same duty during the tests of all buses, in order that errors due to the human element may be kept as constant as possible.

2. HILL CLIMBING TEST

Each bus submitted for test will be operated in a hill climbing test two or more times up and down Mt. Pleasant Avenue, West Orange, for a distance of about 6,000 ft. on a grade averaging 7.35 per cent and having a maximum of 11.02 per cent. Two groups of tests will be made: A. From dead stop at beginning of the grade. B. With 25 miles per hour running start at the beginning of the grade.

Time will be recorded at the beginning and end of each run and at such intermediate points as may be determined by gear shifts.

Speed will be recorded at established points along the grade and at points where gear shifts are made, using the same devices as in the schedule tests.

Gears used during each run will be recorded.

Brakes, both service and emergency, will be tested singly on the runs down grade to determine their ability to hold the loaded bus.

Temperature of the cooling water will be recorded during the progress of the test, using the same devices as in the schedule tests.

Weight of the bus and its load will be practically the same as in the schedule tests. Maximum loads may be used on later tests.

Tire pressures will be the same as in the schedule tests.

Gasoline consumption will not be measured, but gasoline of the same kind and quality as used in the schedule tests will be used and the carburetor will have the same setting as in the schedule test.

Weather, pavement and traffic conditions will be recorded.

Driver shall be furnished by the agent.

Observers will be furnished by the Transportation Company.

3. ACCELERATION TEST

Each bus submitted for test will be operated in an acceleration test over a section of Lake Street, Newark, adjacent to Branch Brook Park and north of Bloomfield Avenue. This section is straight and level, is unimpeded by traffic and has a smooth asphalt surface. Each bus will be operated from a dead stop to free running speed in the shortest possible time consistent with good operation. Several runs will be made to secure a fair average.

Time will be recorded at the beginning and end of each run and at intermediate points.

Speed will be recorded at established points on the run and where gear shifts are made, using the same devices as in the schedule tests.

Weight of the bus and its load will be practically the same as in the schedule tests. Maximum and light loads may be used on later tests.

Gasoline consumption will not be measured, but gasoline of the same kind and quality as used in the schedule test will be used and the carburetor shall have the same setting as in the schedule tests.

Driver shall be furnished by the agent.

Observers will be furnished by the Transportation Company.

4. BRAKING TEST

Each bus submitted for test will be operated in a braking test over the Lake Street course used for acceleration tests. Each bus will be braked from a previously sustained speed of 25 miles per hour to dead stop, using the service brake and the emergency brake independently, in the shortest possible time without slipping the wheels. Several runs will be made to secure fair averages.

Time will be recorded at the beginning and end of each run.

Speed will be recorded at the beginning of each run and at intermediate points.

Weight of the bus and its load will be practically the same as in the schedule tests. Maximum and light loads may be used on later tests.

Tire pressures will be the same as in the schedule test.

Drivers shall be furnished by the agent and by the Transportation Company and they shall be used in turn.

Observers will be furnished by the Transportation Company.

Large Shop for Brooklyn

PLANS are being prepared for large repair shops for the Brooklyn-Manhattan Transit Company. They will be located between the Sea Beach right of way on the west, Shell Road on the east, Avenue X on the north and Coney Island Creek on the south. This tract comprises about 60 acres. It is said that the total investment in these shops when completed will be about \$10,000,000 and that they will be the largest electric railway shops in the country.

Boston Elevated Occupies New Shops

DURING January the Boston Elevated Railway paint department was moved to the new paint shop, forming part of the new elevated shops in course of erection near the Everett terminal, and during February it is expected that the new woodworking shop in the same shops will be completed and its machinery installed. As yet the company has not begun construction on the buildings to house its machine shop, equipment shop, wheel and axle shop and blacksmith shop. In other words, about half of the shops, shown in plan on page 240 of the *ELECTRIC RAILWAY JOURNAL* for Feb. 10, 1923, or that portion to the south, has been completed. The portion to the north still remains to be done.

The present extensions to the company's repair facilities obtained through the erection of these shops will be a great help in the maintenance of equipment. It will enable the company to shut down its Bartlett Street shops. The Albany Street shops will necessarily be kept in service until the completion at Everett of the machine shop. Below will be found a list of the new tools ordered for the paint shop, brass shop and mill at Everett. Most of these tools are now in position.

LIST OF NEW AND REMODELED TOOLS AT EVERETT SHOPS

MILL		
Kind	New Tools Size	Make
Molder.....	No. 600	Fay & Egan
Sander, 42 in.....	No. 393	Fay & Egan
Double surfacer.....	No. 140-A	Fay & Egan
Ripping and jointing machine.....	No. 386	Fay & Egan
Hand planer and jointer.....	No. 506	Fay & Egan
Band saw.....	No. 50	Fay & Egan
Double-head sash and door tenoner.....	No. 505	Fay & Egan
Hollow chisel mortiser.....	No. 510-A	Fay & Egan
Double spindle shaper, type F.....	No. 452	Fay & Egan
Doweling and rod machine.....	No. 7	Fay & Egan
Corner and rounding machine.....	No. 294	Fay & Egan
Band saw filing and setting machine.....	No. 3	Fay & Egan
Circular saw filing machine.....	No. 5	Fay & Egan
Patternmaker's lathe.....	No. 411	Fay & Egan
Double-disk sander.....	No. 466	Fay & Egan
Cabinet surfacer.....	No. 156	Fay & Egan
Knife grinder.....	No. 101	.....
Heavy bevel and mitersaw.....	No. 22	Pettingill
Single spindle borer.....	No. 356	Greenlee
Railway cutoff saw.....	No. 6	American
Universal saw bench.....	No. 30	American
Hand block sander.....	No. 16	American
Grindstone.....	36 in.	American

Old tools equipped with new individual motor drive		
Buzz planer.....	16 in.	Rogers American
Inside molder.....	13 in.	Rogers
Large mortiser.....	Car mortiser	Greenlee
Small tenoner.....	No. 2	Houston
Band saw, 2 in.....	42 in.	Fay
One universal boring machine.....	No. 8	Fairhaven
One arbor saw.....	Tilting arbor	American
Circular saw.....	.....	Fairbanks

BRASS WORKER'S TOOLS		
Belt polisher.....	.....	Blount
Double emery wheel.....	12 in. x 2 in.	U. S. Elec. Tool Co.
Two buffing wheels.....	12 x 1 1/2 in.	U. S. Elec. Tool Co.

SHEET METAL TOOLS		
Circular shears.....	No. 208	Niagara
Squaring shears.....	No. 896 in.	Niagara
One power punch.....	No. 36	Niagara
Hand brake.....	8 ft.	Dreis & Krump Mfg. Co.
Hand brake.....	4 ft.	Dreis & Krump Mfg. Co.
Hand shears.....	No. 14	Niagara
Hand punch.....	No. 14	Niagara
Bar folder.....	36 in.	Peck Stow & Wilcox
Nazel hammer.....	No. 2	Nazel Eng. Works

PAINT MIXING MACHINERY		
Three heavy duty mixers.....	200 gal.	J. H. Day Co.
White lead mixer.....	50 gal.	J. H. Day Co.
Three change can mixers.....	50 gal.	J. H. Day Co.
Ten enamel paint mixers.....	10 gal.	J. H. Day Co.
Three stone color grinders.....	15 in.	J. H. Day Co.
One pebble mixer and grinder.....	No. 7 Abbe	J. H. Day Co.
One putty mixer.....	48 in.	J. H. Day Co.

OVENS		
Electric oven.....	6 ft. x 6 ft. 4 in. x 3 ft. deep.....	Oven Equip. & Eng. Co.
Electric oven.....	7 ft. 6 in. x 6 ft. 9 in. x 6 ft. deep.....	Oven Equip. & Eng. Co.
Electric oven.....	3 ft. 6 in. x 5 ft. 6 in. x 3 ft. 6 in. deep....	Oven Equip. & Eng. Co.

New Features of St. Louis Automatics

Five Substations Installed by United Railways Have Forced Ventilation and Duplicate Power Lines—Units Chosen for Full Load Operation with Provision for Exchanging Equipment to Obtain Future Increased Capacity

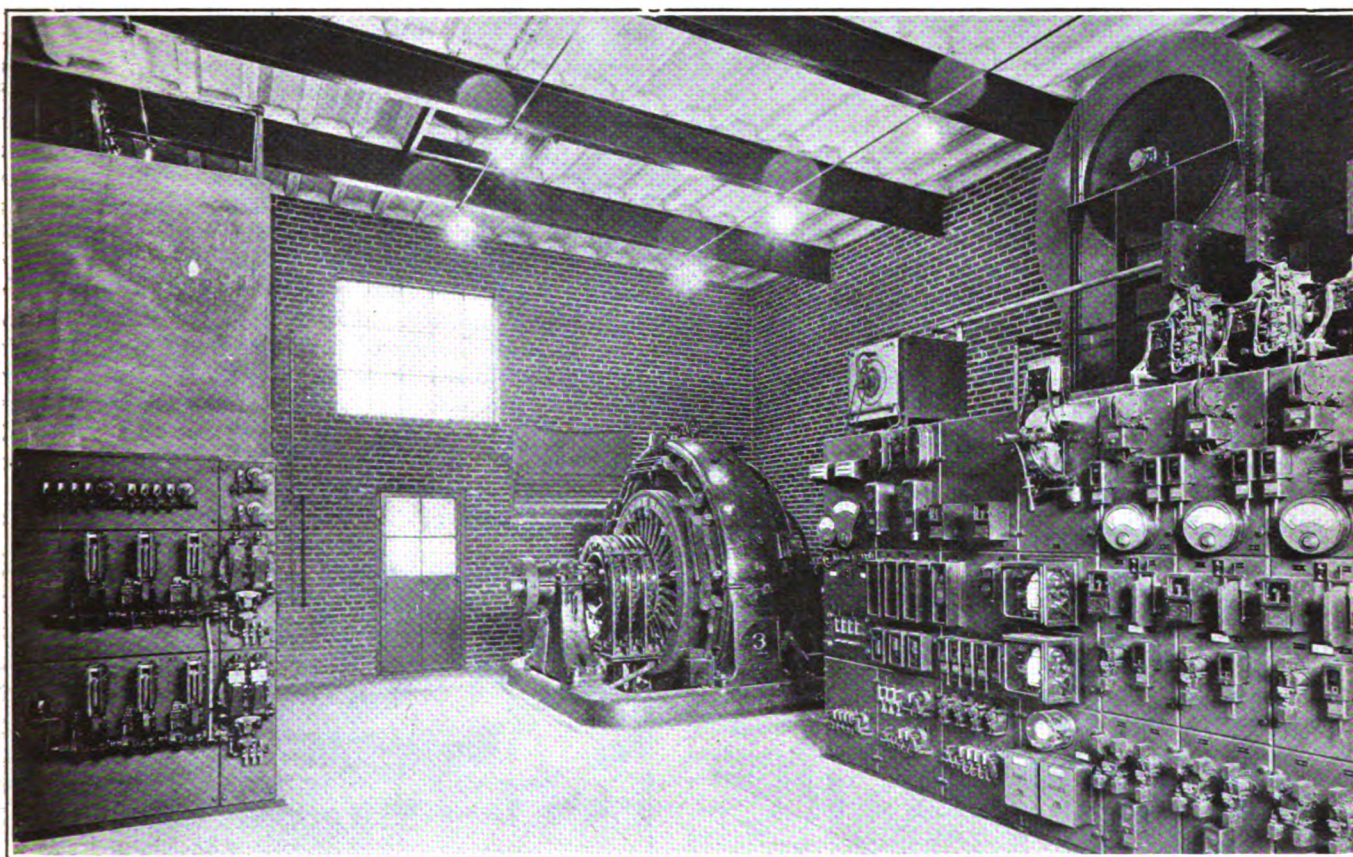
SUCCESSFUL operation of the fifth automatic substation installed during the past year marks the completion of the present program of the United Railways of St. Louis for the application of this type of station to its power system. Careful study of the requirements for applying automatics to the network on a heavy city distribution system have resulted in a number of interesting features which have been incorporated in the new stations and which were developed to insure maximum capacity and reliability.

These features comprise a number of departures from

tion and equipment was carried out completely by the railway, utilizing General Electric Company apparatus.

Two automatic substations, each of 300-kw. rating, have been in service on some of the outlying lines of this property since the early part of 1921, and experience with these stations showed them to be satisfactory for this class of work. Increased car service within the city during recent years resulted in overloading some of the existing manual stations and made necessary an addition to the capacity of the d.c. system.

Some of these manual stations were large enough to



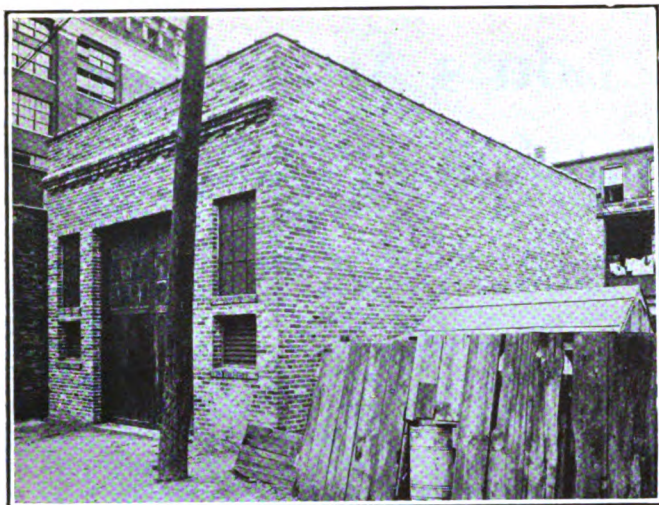
The Franklin Avenue Substation Has a 2,000-Kw. Unit. A Portion of the 2,000-Amp. Multiple D.C. Reclosing Feeders Are Shown Above the Switchboard to the Right

established automatic substation practice. Natural ventilation was found inadequate during the hottest period of the year, so that forced ventilation is used at such times to obtain the full rating of the machines. The duplicate power lines have an automatic switching arrangement so that in case of failure of one the other will take its place without delay. The stations are designed as complete units, with no space for additional machinery, but with provision for replacing the converters and transformers with others of larger size in case increased capacity becomes necessary.

These stations were designed by the railway company's engineers under the direct supervision of W. E. Bryan, superintendent of power. The work of construc-

allow the installation of additional converter capacity, and previous practice would have dictated such installations. The advent of the automatic station, however, made it possible to effect a material reduction in distribution copper and distribution losses by applying these units as nearly as possible at the points of maximum power requirement. As a result, it has not only been possible to locate the new substations so that the trolley voltage regulation has been materially improved, but at the same time it is estimated that the use of the new stations will allow the removal of approximately 125,000 lb. of copper now in the distribution system.

Two of the five stations put into service since



A Simple Building Is Used Where the Surroundings Permit

January, 1921, are single units of 1,000 kw. capacity, each, with oil-cooled transformers. These stations are Maple and Arsenal and their equipment is entirely new.

Clark and Franklin stations have each a single 2,000-kw. unit. The rotary and transformer equipment was used for about nine years in manual stations, but was suitable for use with the automatic apparatus which was purchased. In these two stations the transformers, of the forced air-cooled type, are mounted in a separate transformer room. In the other three stations the oil-cooled transformers are mounted in the same room with the other apparatus.

Each station as installed is loaded to its full rating with the existing load. No space is allowed in the buildings for additional units, but the design is such that the present machines can be replaced with the next larger commercial size to take care of future requirements. Such a change requires only the replacement of the rotary and the transformer. The buildings are made small and compact, but the arrangement is such as to allow for changes of this kind.

Under the plan adopted, the existing stations can be expanded in gradual steps so that they are always loaded up to capacity. A considerable saving is made in the cost of buildings over the practice of making the structure large enough to take one or more additional machines. Furthermore, it was considered that the addition of a second machine to an existing station would mean an increase in capacity of 100 per cent, which probably would be in excess of the requirements for some time after the addition was made.

In manually controlled stations the problem of ventilation is not serious. The stations are usually made of liberal size and plenty of door and window space can be allowed because of the presence of attendants. These conditions do not hold with automatics. It was considered desirable to make the buildings as compact as possible and to keep them closed, particularly as some of them were located in congested districts where minimum size and maximum security were important.

Natural ventilation, depending upon louvers in the side walls and some form of roof ventilator to maintain a circulation of air through the station, was not considered entirely satisfactory. With natural ventilation, the amount of air circulated varies with the temperature of the air and the direction and velocity of the wind. It was found that the full rated capacity of the station could not be obtained in hot weather because

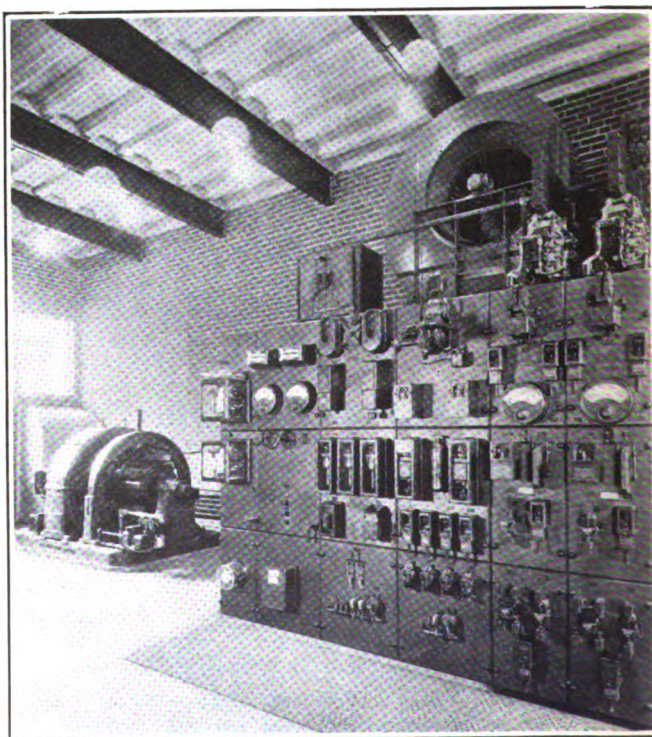
of inadequate ventilation. A forced draft ventilation system was designed by the railway to remove this limitation. It consists primarily of a fan mounted on a concrete balcony above and behind the switchboard and arranged so as to draw air out of the station and exhaust it at a point near the roof. The fan used is the Buffalo Forge Company "Turbo-Conoidal" type No. 7½, with a capacity of 11,500 cu.ft. per minute. It is driven by a 5-hp. motor. The fan is automatically started and stopped by thermostats on the converter and on the station resistance grids.

Although the stations are provided with a number of wall louvers near the floor line, all but two of these are closed when the fan is operated, which is necessary only in hot weather, as the natural ventilators take care of the requirements at other times. When forced ventilation is being used, the incoming air is drawn directly around the rotary converter and transformer and is blown through the series resistance grids before being exhausted.

A sheet metal duct is installed at one of the wall louvers and leads the incoming air down to a duct in the concrete foundation under the converter, from which it passes directly up through the machine. A second and similar duct leads the air coming in through the second wall louver to a passage in the foundation under the oil transformer and it then passes up through openings around the base so as to create a draft of cool air on all sides. In those stations where forced air-cooled transformers are used, they are provided with a separate blower independent of the ventilation system.

Variable conditions surrounding the different stations affect the height of the louvers in the wall. It is the practice to set these as close to the floor line as possible, but where the location of the station exposes it to considerable dust, the louvers are raised 4 or 5 ft. above the floor line so as to keep the dust from entering the station.

The resistance grids are inclosed in a housing made



A Single 1,000-Kw. Unit Is Installed in the Arsenal Street Station. The Ventilating Blower Is Mounted Above and Behind the Switchboard

of 1-in. transite board mounted on a steel frame. This housing is directly connected to the discharge side of the station fan. The entire front of the resistance housing is made up of a series of swinging shutters, so that it can be opened to the rest of the station when the fan is not operated and the ventilation is by natural means.

The system is designed so that the station can, if necessary, be operated at 50 per cent overload with a rise in the temperature of the air of not more than 25 deg. F. A comparison of costs shows that the total cost of the fan and motor is about equal to the cost of the additional roof ventilators that would have had to be installed for natural ventilation.

Substantial construction consistent with minimum cost was the object of the building design. In each case the structure has been made to fit into its surroundings. Where the station is located so as to face the street in either a residential or business neighborhood, terra cotta trim is applied to improve the appearance. Some of the stations are located on alleys in congested districts, and under these conditions the entire structure is made of common brick. One station of this type is shown in an accompanying illustration.

Clark, Franklin and Evans stations are located in heavy traffic districts, where uninterrupted operation is of paramount importance. By utilizing existing high-tension power lines, these stations are arranged so that each has two incoming 13,200-volt, three-phase, 25-cycle supply cables, practically all power being purchased. Each of these cables is of sufficient capacity to carry the entire station load.

Maple and Arsenal stations are less vital to the maintenance of continuous service, and they are, therefore, equipped with only one incoming line to the automatic apparatus. In the case of Maple station, however, a second incoming cable is available and the station can be thrown over to it by the operation of a manual switch.

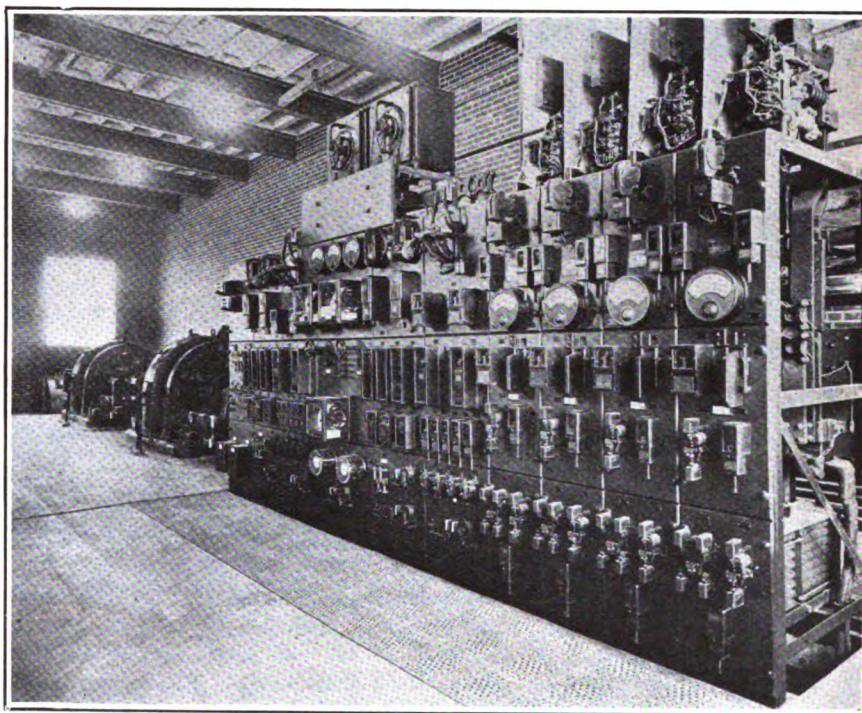
Automatic switching between the two incoming cables is provided in Clark, Franklin and Evans stations. One of the lines is designated as the "preferred" line and under normal conditions carries the entire load at all times when the station is in operation. If the preferred line fails for any reason, the second line is immediately and automatically substituted. This is accomplished through the tripping relay, which when tripped completes the circuit, causing the second line to pick up the load. When the trouble on the preferred line is removed and the repair man closes the disconnects out on the line the load immediately shifts back to the preferred cable.

Evans station is a two-unit installation. Each of the 1,000-kw. rotaries is provided with its own oil-cooled transformer, and the station is also one of the three having duplicate power lines. In this case the load of both machines is carried on one of the lines, and in case of trouble the second is switched in automatically as in the case of the single-unit stations.

Either machine may be made the first to pick up the load by throwing a manual switch in the station. The two machines operate in parallel when both are on the line, but only one is required to carry the load except in the peak period. When it is needed, the second machine is brought on automatically, and it also shuts down automatically when the load drops to the capacity of the first rotary. If No. 1 machine is set to pick up the load first when the station goes into service, and for any reason it fails to do so, No. 2 machine will automatically take its place.

In this station a single exhaust fan provides the ventilation for both sets of rotaries and transformers. The ducts in the concrete below the rotaries are divided so as to insure equal distribution of air to both machines and also to avoid diverting the air through one of them, if it is not running.

All the stations are completely equipped with high-



The Evans Avenue Substation Has Two 1,000-Kw. Units. The Two Converters and Complete Switchboard are Shown with Reclosing Breakers Above

speed circuit breakers on outgoing feeders. These are provided with automatic "feel out" reclosing apparatus arranged to test the circuit at predetermined intervals through an auxiliary contactor and current-limiting resistance. An adjustment on these breakers, which was made by the railway's engineers, allows the first test contact to be made after a very short interval. This contact is then repeated periodically at any predetermined time setting.

The high-speed breakers are designed to differentiate between a legitimate load and one caused by a defect on the circuit. An inductive shunt on the breaker allows it to carry a 4,000 or 5,000-amp. normal load, but to trip out on less than 2,000 amp. in the event of a ground or short.

In Clark and Franklin stations, which are located in the downtown heavy traffic section of the city, the rotary converters are shunt wound. In this district the feeder network between the automatics and the adjacent manual stations is of very low resistance. The object of the shunt winding on the rotaries of the automatic stations is to prevent them from taking more than their proper share of the load, without at the

same time causing objectionable fluctuations in voltage. This would occur if the load-limiting resistance of the automatic station cut in, because this resistance is a large proportion of the entire feeder resistance in this section.

The shunt winding drops the voltage of the automatic station gradually as the load increases, and thus prevents it from carrying an excessive proportion. Cars operating in this section move slowly, either on resistance notches or with motors in series a large portion of the time, so the reduced trolley voltage due to shunt winding of the rotaries is not considered objectionable. In the outlying sections the feeder resistance is relatively higher and compound-wound rotaries are used. The load regulation is handled by the station series

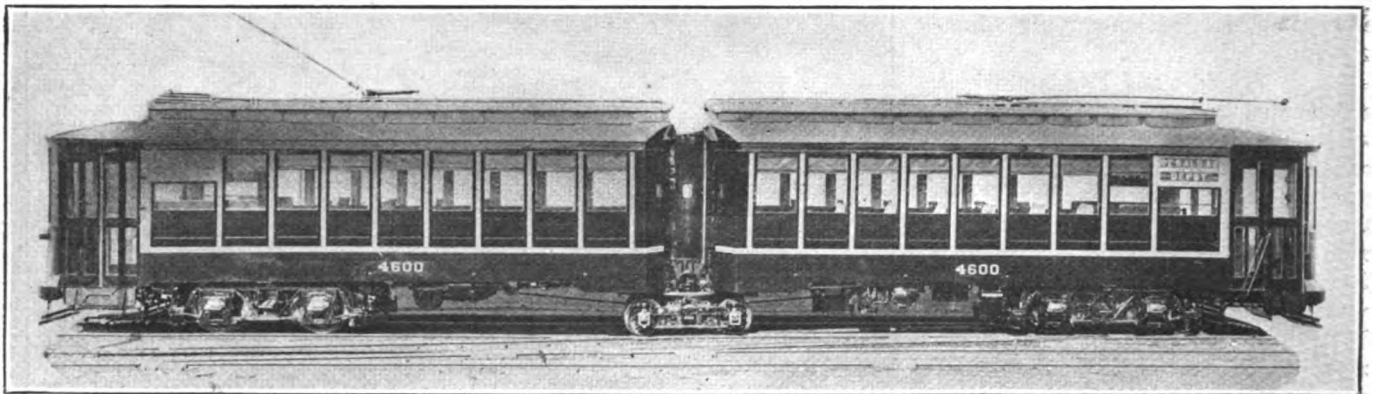
resistance, as under these conditions cutting in of the resistance does not produce as great a voltage fluctuation as would occur in the congested district.

As is customary, thermostats on the load-carrying apparatus are arranged to shut down the station if the temperature becomes excessive on any part. The bearings are similarly protected.

On the air-cooled transformers the blower motor is tied directly to the low-tension side of the transformer. A speed-regulating switch on the blower end will trip out the station if the fan is not up to speed for any reason. When the station shuts down due to a defect in its apparatus, a telltale signal is illuminated in an adjacent manually operated substation so that the load dispatcher can be immediately notified.

Brooklyn's "Duplex Car" Placed in Service

A Two-Unit, Three-Truck Car, 63 Ft. 10 In. Over All, Has Novel Center Construction with Weather Tight Drum to Permit Free Passage Between the Two Sections



The New "Duplex Car" with Three Trucks Constructed by the Brooklyn-Manhattan Transit Corporation

A NEW type of duplex car with three trucks was placed in service by the Brooklyn-Manhattan Transit Corporation Feb. 6 on its DeKalb Avenue surface line in Brooklyn, N. Y. This car is built in two units and has an over-all length of 63 ft. 10 in. with seats for seventy-one passengers. The standing room provided will accommodate approximately 100 additional during rush hours. The weight of the experimental car as constructed is about 36 tons, but this weight can be reduced somewhat when parts are designed for quantity production.

In building this duplex car the company used two of its 4,500 type cars, which as originally constructed were 42 ft. 6 in. long over all. These cars were cut off at one end just outside of the bolster, which was then used as a support for the new swivel castings. The truck used for supporting the center portions of the two units is a Brill type 62 EF, such as that used by the company under its center-entrance trail cars. This truck has a wheelbase of 4 ft. 4 in., with 22-in. diameter wheels. The truck was used without changes except those necessary to provide for attaching the truck swivel casting and side bearing plates for the body.

The construction of the center section of the duplex car is of particular interest. A drum type vestibule connects the two sections, being carried directly on the center truck by strap connections to the truck bolster.

This drum is 4 ft. in diameter. Two circular sections of $\frac{3}{4}$ -in. steel inclose the two opposite quadrants, being supported by a $\frac{1}{2}$ -in. bottom plate, the open quadrants forming the passageway through the center section. The inside of the drum is lined with a fibrous material and rubber matting covers the floor. This connecting vestibule between the two units is used by standing passengers during peak-load periods. There is sufficient space inside the drum for eight standees. Two grab handles extend around the circumference on either side. These are located at a height of about 43 in. above the floor level.

The center ends of the two-car units are shaped so as to come into relatively close contact with the center drum, and as they rotate about a common center only a small clearance is needed. Rubber rollers mounted on the bodies provide for a weathertight connection between the car ends and the drum. Each roller is supported at the top and bottom by bearings in a plunger with springs to press it firmly against the surface of the drum.

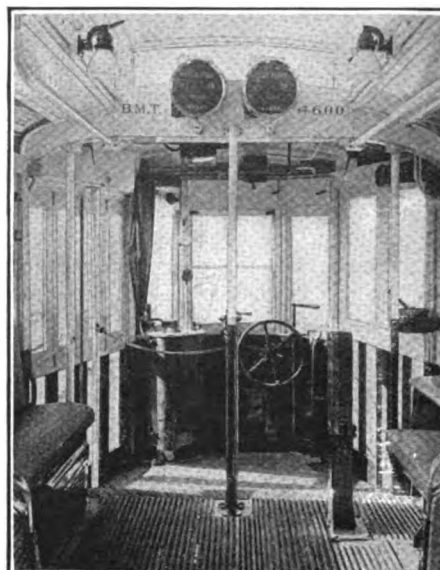
The top of the center vestibule drum extends only to the bottom of the clerestories of the two units. In order to keep water from dripping down inside, and to secure satisfactory drainage, the top of the drum is provided with three angles bent to circular arcs at the edges adjacent to the car ends. The top of the drum



Conspicuous Signs Give Passengers Necessary Information as the Car Approaches



Unrestricted Passage Between the Two Units Is Provided by the Center Vestibule Drum



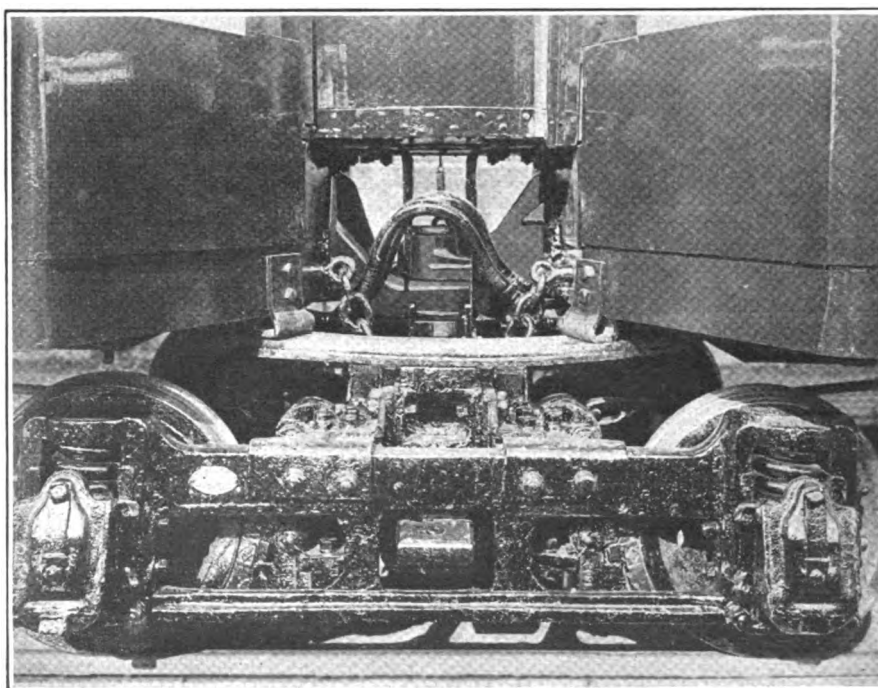
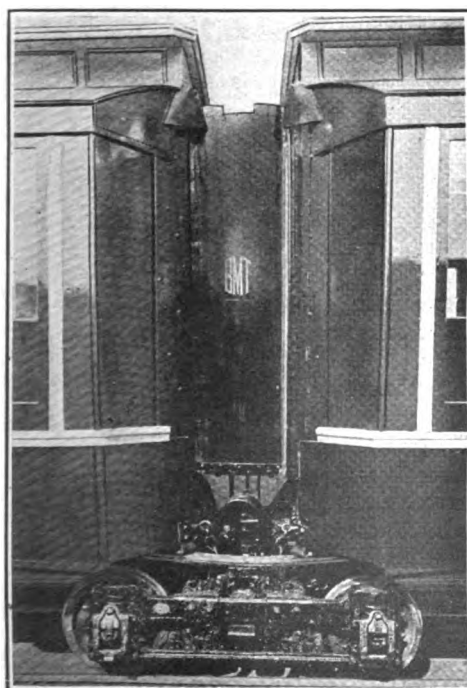
Porcelain Enameled Bars and Stanchions Provide Substantial and Sanitary Supports for Standing

is also shaped so that the lowest portions are at the sides, and the top of the drum adjacent to the two units passes underneath the clerestory. Thus any drippings from this will fall inside the angles. If any water should splash over the top of the first angle, the other ones are provided as a barrier to conduct the water to the edges for draining.

The construction of the underframing and swiveling castings at the inside ends of the two units is of particular interest. Three swiveling castings are provided. The upper and center ones are attached to the underframes of the two bodies, while the bottom casting is attached to the truck bolster. The king pin fastens through these three castings and through the truck bolster bearing, as shown in an accompanying drawing. Channels of 4-in. section are used for the outside members and the diagonal braces, and two 6-in. channels run directly from the swiveling casting to the cross-members of the

underframe. The construction is substantial, the entire weight of the inside end of each unit being borne by its swivel casting and transmitted through the spherical bearings to the truck bolster. Circular side bearings are provided, but these serve only to prevent excessive side motion and do not support the weight of the body. Circular steel plates on the trucks attached to the center bolster and similar plates riveted to the ends of the car bodies form these side bearings.

The air and electrical flexible connections between the two units are carried over the top of the center truck. The air hose passes on one side and the electrical connections on the opposite side of the swivel joint. In order to provide for taking the two units apart, as may be necessary for maintenance repairs, a special type of junction box is provided for the electric wires. It consists of two facing terminal boards, the leads from the car body ending in a set of socket terminals



At Left, the Center Vestibule Drum Effectively Closes the Space Between the Two Units and Is Supported by Straps to the Truck. At Right, Support for the Inside End of the Two Units Is Provided by Swivel Castings. A Standard Trail Truck Is Used

the car at the center end of each unit on either side of the drum vestibule, and also over the center vestibule, directing passengers to leave by the front door. Attention is called to the fact that this should reduce the average length of stop and that passengers alighting have an opportunity to cross the street before vehicular traffic proceeds.

Special attention has been given to providing exterior signs which will direct passengers as the car approaches. Routing and destination signs are con-

spicuously displayed. A large sign below the window on the front and rear of the car reads: "Enter at Rear and Have Exact Fare." In the center above the window is a curtain type destination sign, and on either side of this are two route signs. Route and destination signs are also displayed at sides at the end windows.

The present painting of the car corresponds to the standard red and yellow painting scheme used in Brooklyn. The interior is painted a light color to assist in providing ample illumination.

Rail Corrugation Experience

Survey of Railways in Various Parts of the Country Brings Out Interesting New Data as to Extent of This Trouble; Practices Followed in Removing and the Cost, and Comments as to Causes of Corrugation

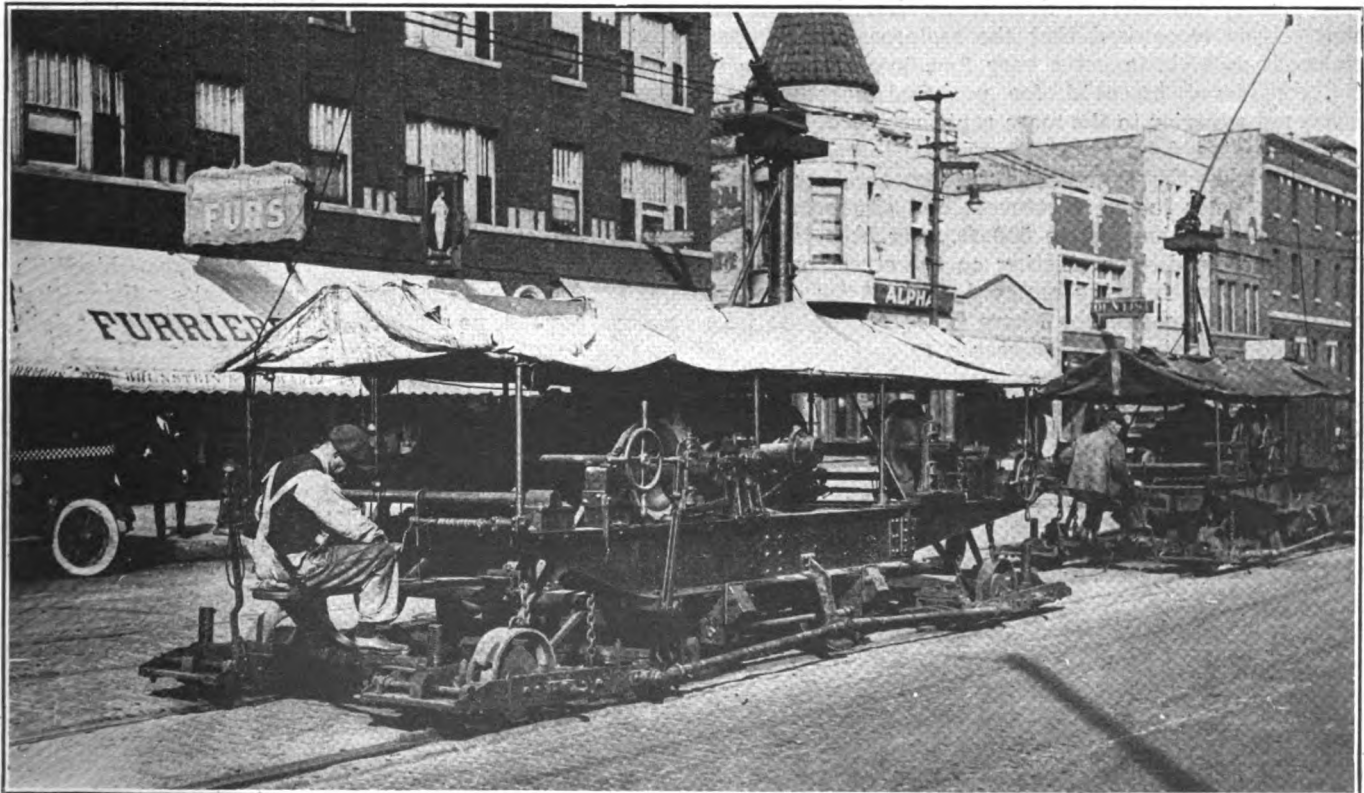
RAIL corrugation, the cause of which is still as baffling as ever, is a problem of considerable magnitude to the men responsible for expenditures for track maintenance. This is clearly brought out in the summaries of present-day experience by the track engineers of a number of electric railways throughout the country, as presented by cities in what follows:

There is no uniformity of experience as to the type of construction or type of rail on which corrugation is most likely to occur. The length of the waves is reported to vary all the way from 1½ in. up to 8 in., and this appears to vary with the kind of equipment operated, i.e., single car, multiple-unit train, electric locomotive, etc. All reports agree that no definite relation can be found between length of wave and wheel diameter, and there is similar agreement as to any direct relation between number of wheel passes and the start of corrugation. But there seems to be some consensus of opinion that after corrugation starts the rate of

development is then in proportion to the number of wheel passes. Joints, in general, are not considered a source of corrugation origin. Other ideas about corrugation and the best method of preventing and removing it differ considerably on the individual properties.

The Chicago Surface Lines during 1923, we learn from H. B. Fleming, chief engineer, found it necessary to grind out corrugation on 42 miles of single track. Corrugation in this city is found under many different combinations of construction and traffic. It is found on practically all types of track used in Chicago with the exception of high T-rail. Many attempts here to determine the effect of different types of construction have given no consistent results from which conclusions could be drawn. Neither has comparison of the results obtained with rigid concrete foundation track and track with crushed stone ballast.

Three years ago a change was made in rail laid from Lorain section 129 to section 130. Some of the latter,



The Special Double-End Grinder Used in Pairs on the Chicago Surface Lines to Remove Corrugation

laid on the old foundation on Wabash Avenue, where traffic is extremely heavy, has shown very little corrugation after three years of service, whereas the 129-lb. section previously had corrugated badly after less than a year in service. In this case the new rail was laid on the old foundation and no other change in the construction made.

Corrugations in Chicago are of various lengths and depths and develop under various combinations of wheel sizes. No definite relation has been established between the rate of corrugation development and the number of wheel passes. In some cases sections of track under heavy traffic will be free from corrugation, while other sections of the same track under the same traffic and sometimes in an adjacent block will corrugate badly. After corrugation starts, it, of course, develops more rapidly under heavy than under light traffic. In some cases standard construction track has started to corrugate in spots almost immediately after being laid.

Several types of grinding apparatus are used for the removal of corrugation in Chicago track. Atlas grinders are used for small work, and also Chicago Pneumatic Tool hand grinders for cleaning up small spots. Kerwin grinders are used for cleaning up long sections. The Surface Lines developed a double end machine some time ago, which is particularly suited for the large amount of such work required on this largest of surface line systems. These machines were described in *ELECTRIC RAILWAY JOURNAL* Sept. 23, 1922, page 452. They are frequently operated in pairs, as shown in an accompanying picture. The ordinary Kerwin grinder was equipped with four grinding wheels instead of two, which permits the work to be done twice as fast with the same crew of two men. The front pair of wheels takes the initial cut and the rear wheels do the finishing. Strand grinders are also used for some classes of work in Chicago. Reciprocating machines have not been found satisfactory for this work and are not used, the primary objection to them being that they are too slow. It is recognized that the reciprocating grinder makes it possible to get a very fine finish, but this is not considered essential for practical purposes and hence not superior to the more rapid rotary grinder.

Grinding is done at night on heavy traffic streets or sometimes throughout the full twenty-four hours. The practice is to use crossovers and single-track the cars past a section 200 to 500 ft. long at a time, depending on conditions existing on the street on which the corrugation is being removed. The Atlas grinders are used under conditions where it is desirable to take the grinder off the track between cars.

No allowable depth of corrugation before grinding is determined. It is the practice to remove it as rapidly as it develops and this is carried out as far as the equipment available and the personnel will permit. If a section of rail becomes too badly worn to permit of grinding economically the rail is removed.

The experience in Chicago is that corrugation tends to destroy the entire track structure, as well as to cause rapid destruction of equipment and discomfort to passengers. After grinding, there is apparently no definite cycle of recurrence, although careless workmanship will cause corrugation to develop again because it was not entirely removed. There is no evidence that it develops on properly ground rail any more or less rapidly than on new rail. The grinding, of course, affects the life of the rail in proportion to the amount

of metal which must be removed. Maximum economy in rail life is believed to be obtained by grinding as soon as any evidence of corrugation is found.

As said before, very little trouble has been experienced in Chicago with T-rail. Installations of 7-in. 91-lb. Lorain section in 1908, laid with beveled tie plates which tilted the head of the rail inward slightly, have shown very little corrugation.

CLEVELAND CORRUGATION OF SMALL EXTENT

The experience of the Chicago company with tilted T-rail is corroborated by that of the Cleveland Railway. Charles H. Clark, engineer maintenance of way, reports that the Cleveland Railway has no corrugation to speak of on straight track. There has developed once in a while a soft spot in the track with slight corrugation, but little notice has been taken of it. For a number of years the company has tilted its rails 1 in 25. It has been Mr. Clark's opinion that corrugation starts at the gage line of the rail where the gage line of the wheel produces very heavy pressure and causes the steel to cold roll and flow ahead of the wheel in waves. By tilting the rails the pressure of the wheel has been transferred to the middle third of the wheel tread, and as to the result, Mr. Clark says, "The answer is that we have no corrugation on straight track," except as noted above in small degree where soft spots develop. Some severe corrugation, however, has been experienced on long radius curves in paved streets where the cars make 25 m.p.h.

PITTSBURGH FINDS TIGHT TRACK ONE CAUSE

After a several months study of rail corrugation on the Pittsburgh Railways, I. E. Church, special engineer, reached these general conclusions:

"After a thorough inspection of our track we came to the conclusion that all track corrugates more or less. In other words, that the rail in wearing down wears unevenly. The main difference is in the closeness of the unevenness. When the high and low spots are greater in length than about 6 in. the car will roll over the track smoothly, but when they are closer together the car begins to bounce and the corrugations become noticeable. With the aid of a few strokes of a reciprocating grinder, I could find these hills and hollows on any rail.

"Now, then, the question is what conditions contribute to shortening up these depressions to bring the rail to the condition popularly known as 'corrugated.' With our track I found that the one universal condition that always applied, no matter what other conditions might or might not be present, was tight track. If we had from $\frac{3}{8}$ in. to $\frac{1}{2}$ in. between wheel and track gage the corrugations were far enough apart to cause no trouble and hence could be classed as 'uncorrugated.' Our standard difference between wheel and track gage is $\frac{1}{4}$ in., but during 1920 a slight mistake was made in the track gages so that all rail laid during that year was laid too tight and it is all corrugated. We, of course, have track corrugated that was laid to our standard, but in the majority of cases there are spots or sections where the rail was pulled closer or has distorted enough to make it a little under gage.

"We also have corrugated track that is a little wide of gage, but this is mostly at points where the subsoil has sunk, leaving the ties hanging to the rail and the whole supported by the pavement.

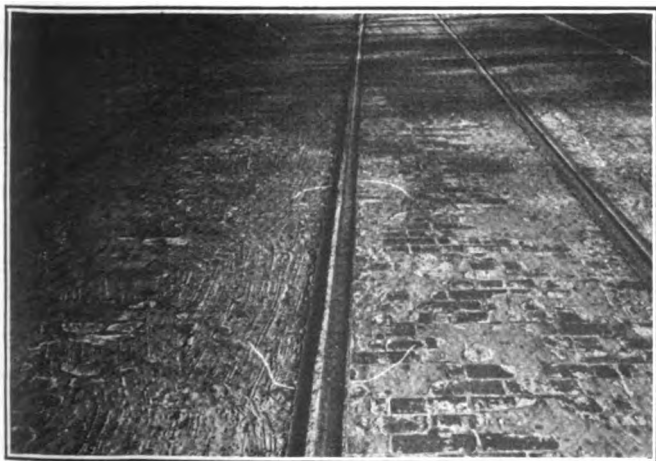
"With our type of track construction, I would say

that if we would allow from $\frac{3}{8}$ in. to $\frac{1}{2}$ in. difference between the wheel and track gage and always have the ties resting on a good foundation we would never be bothered with corrugations on straight track. As to curves, if the radius is such as to allow a car speed greater than 7 m.p.h. the track will corrugate no matter what other conditions apply."

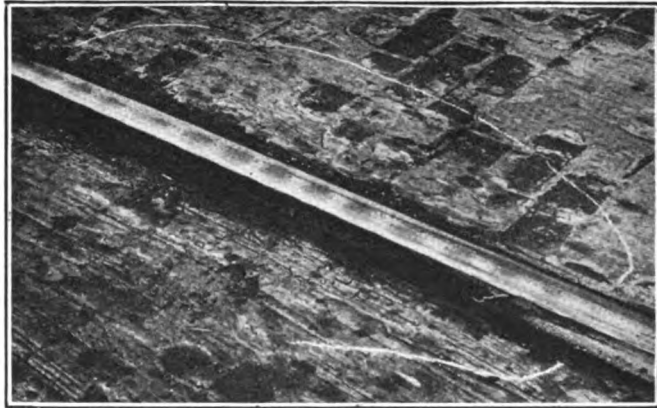
COLUMBUS, OHIO

E. O. Ackerman, engineer of way Columbus Railway, Power & Light Company, Columbus, Ohio, writes that corrugation occurs on almost every track on the Columbus system, requiring periodical removal by grinding. The extent of the corrugation can be judged by the fact that the cost of its removal is approximately \$10,000 per year. The corrugation develops more quickly on rail wherein the wheel bearing is close to the gage line. The lengths of corrugations are about 3 in., this being almost uniform throughout the system. Mr. Ackerman says that he has never discovered any relation between wheel diameter and the length of rail corrugation. Similarly, the number of wheel passes bears no definite relation to the rate of corrugation, except that for each individual case an increased number of cars increases the corrugation, which is of course to be expected. The rate of corrugation development differs so much on different lines and different rails that no definite method of determining the rate, except observation, has been employed.

The method followed in Columbus to remove corrugation is to use a reciprocating grinding machine until the corrugation is entirely removed. The rapidity with which this can be done depends upon the depth to which the corrugation has been allowed to develop. It is endeavored to remove it as soon as it is plainly visible. By so doing, the damage to the rail is reduced to a minimum. On the other hand, if corrugation is not removed, it tends to shatter the foundation and pavement and loosen the entire structure, as well as damage the car equipment. Removing corrugation by grinding does seriously affect the life of the rail. The damage caused by corrugation on the Columbus railway system is placed at not less than \$25,000 per year. After grinding, corrugation will reappear, the rapidity of this depending on the position of the wheel bearing on the rail.



Both These Tracks on Main Street, Columbus, Ohio, Were Built at the Same Time. Corrugation Developed on the Left Track Where the Wheel Bearing Was Close to the Gage Line. No Corrugation Has Developed on the Right Track, Where the Bearing Was Considerably Away from the Gage Line



Appearance of Corrugated Rail in Columbus, Ohio, After It Has Been Rubbed with Reciprocating Grinder Sufficiently to Brighten the High Portions

The reciprocating machine manufactured by the Railway Trackwork Company, Philadelphia, is used by the Columbus company for removing corrugation. A photograph reproduced herewith plainly shows corrugation on the rails of one track laid to bring the wheel bearing close to the gage line, while on the rail of the other track built at the same time, but laid to bring the wheel bearing considerably away from the gage line, there is no corrugation. Both tracks have been subjected to equal traffic.

The organization for grinding work consists of two crews of three men each, who operate two grinders.

PHILADELPHIA, PA.

In Philadelphia, W. K. Myers, vice-president Philadelphia Rapid Transit Company, advises, the amount of corrugation is comparatively small. This is attributed to the fact that corrugation is never allowed to get much of a start. As soon as evidence of it occurs the grinding machines are put to work.

Corrugation occurs most generally on track which is noticeably loose, and also on track with concrete stringers under the rail. The corrugations vary from 2 in. to 6 in. in length.

Some years ago the P. R. T. developed a machine for measuring the lateral vibration of rail heads under load. The action of this machine was described in an article by J. H. M. Andrews in the *ELECTRIC RAILWAY JOURNAL* in September, 1910. In recent years no investigation work has been done, and Mr. Myers comments that instead of attempting to solve the theoretical problem, effort has been directed toward giving prompt attention to incipient corrugation and preventing its development.

The method employed for removing corrugation is to use a reciprocating grinder with a crew of three men. This outfit can do about 125 ft. per day under the normal conditions of traffic. If the corrugation is well developed, it is necessary to remove the crest of the waves with a Universal rotary grinder, after which the reciprocating grinder is used to finish. The cost of grinding corrugation under average conditions is about 8 cents per foot of track.

Commenting on the destructive effect of corrugation, Mr. Myers said:

"Corrugation destroys paving and track structure. Whether loose track causes corrugation or corrugation causes loose track has never been definitely settled in our opinion. There is no doubt that should corrugation

occur on track which is not loose it would rapidly become loose.

"It is our experience that corrugation is apt to recur. If thoroughly removed, however, and the track reconstructed and well tamped, the probability is that it will not return. We do not believe that the removal of corrugation by grinding seriously affects the life of the rail."

LOS ANGELES, CAL.

B. H. Eaton, engineer way and structures Los Angeles Railway, states that this company has not had serious trouble with corrugation to date. What has occurred has been almost exclusively in solid concrete construction, except occasionally on curves. An interesting observation is that it has been found on curves with certain radii, namely, anything around 65 ft. or 300 ft.

The length of corrugations varies from 1½ in. to approximately 8 in. Corrugation seems to develop more or less in proportion to the number of wheel passes. However, a few exceptions have been noted where it has occurred quite extensively under very few wheel passes.

For removing corrugation the company makes use of a specially built car equipped with two 25-hp. motors. Grinding blocks are suspended from the body of the car on either side between the wheels. These blocks are of carborundum, 2 in. x 2 in. x 8 in., and are forced down on the rail by a system of levers and springs which produce between 400 and 500 lb. pressure. Both rails are ground simultaneously. The car is operated back and forth over the track after regular service has been discontinued. It will grind about 2,000 ft. in three nights work. This car is said to operate very satisfactorily and is the cheapest method the company knows of for removing corrugation. Two men operate this car at a labor expense of \$10.60 per night.

Corrugations are never permitted to get more than ¼ in. deep. If corrugation is allowed to develop unhindered, it will soon destroy the entire structure, usually cutting into the ties, loosening the rail and destroying the pavement by a vertical movement. As to recurrence, the Los Angeles company has a number of locations where there has been no recurrence after grinding. However, the more common experience is that corrugation does reappear. This is particularly true in solid concrete construction.

SAN FRANCISCO, CAL.

B. P. Legaré, engineer maintenance of way and construction Market Street Railway, San Francisco, reports that this company has had a great deal of corrugation on its lines; in fact, nearly every line has developed corrugation to some extent. It has occurred most commonly in rigid concrete construction. The length of corrugation varies. It begins in short waves, a small fraction of an inch long, and if allowed to run for a long time will become 6 or 8 in. long.

The method and equipment employed for removing corrugation in San Francisco are very much the same as that just described for the Los Angeles Railway. No attempt has been made to figure the cost of removing corrugation. It is considered work that has to be done regardless of the cost. The experience is that corrugation returns after it has been removed. Certain track in San Francisco has been ground five or six times in the last ten years. This grinding seriously

affects the life of the rail, as the head is being ground off instead of worn off by wheels.

EXPERIENCE FROM OTHER CITIES

The extent of corrugation in Little Rock, Ark., according to John Card, Arkansas Central Power Company, is 1,300 ft. of track out of 50 miles. All corrugation has occurred in track in pavement, and the corrugation varies from 5 to 7 in. in length. A reciprocating track grinder is used for its removal, which can be done at the rate of 5 ft. per hour at a cost of about 20 cents per foot. Corrugations are permitted to get from ¼ to ½ in. deep before grinding. The grinding not only wears out the rail faster, but it has a tendency to harden it. And corrugation returns more rapidly than it first developed.

F. B. Walker, chief engineer Eastern Massachusetts Street Railway, Boston, reports that this company has 175,000 ft. of rail corrugations per year, mostly in 9-in. girder rail in paved track. Ten reciprocating grinders work continuously during the entire track season, each machine having three men, on a program of removing corrugation as soon as it appears. These machines will each grind from 150 ft. to 300 ft. per day at a cost of 9 or 10 cents per foot of rail. Corrugation does recur in some cases, particularly if the rail is loose on the ties.

Approximately 25 miles of corrugated track out of a total mileage of 484.5 is estimated as the amount existing on the Boston Elevated Railway by H. M. Steward, superintendent of maintenance. It is common to all types of track construction employed in paved streets. The lengths of corrugation vary up to 4 in. Rotary and reciprocating grinders are used for removing corrugation and the speed of grinding with varying depths of corrugation averages about 20 to 25 ft. of rail per hour. This is done at a cost of 23 cents per foot of rail.

Effort is made to remove corrugation soon after it appears. Preference is given to track over which service is heavy and frequent. If allowed to remain, the corrugation will cause rapid deterioration of the track structure on adjacent paving. Corrugation does recur after grinding. Its removal by grinding does not seriously affect the life of the rail.

An interesting special case of corrugation is reported from Bangor, Me. E. W. Jennison, engineer maintenance of way Bangor Railway & Electric Company, states that on one of the two tracks at a sharp change in grade corrugation has occurred, but not on the other track. The track where the movement is down grade and onto the level there is no corrugation. The corrugation has occurred on the track for traffic changing from level to the up grade. Another case of corrugation in Bangor has occurred on the rail through special trackwork. The paving in both cases cited is wood block on a concrete base. The corrugations are approximately 3 in. long and have occurred only in girder rail.

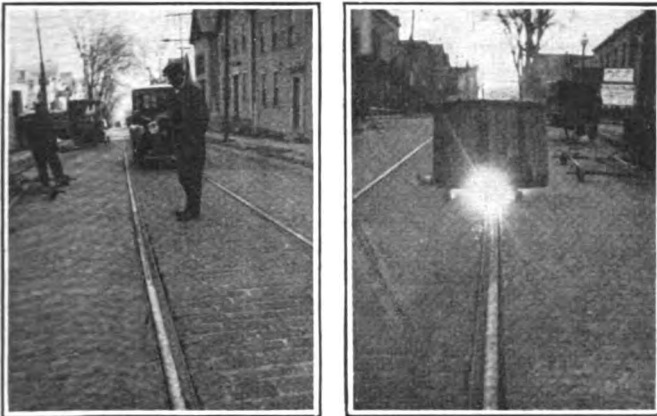
The only place where corrugation has developed in the track of the Key System Transit Company, Oakland, Cal., has been on very rigid construction, mostly on 141-lb. girder rail laid in concrete. But the amount is small, according to H. O. Demeritt, engineer maintenance of way and structures, and only a few nights each year are devoted to grinding off corrugations.

George N. Cole, engineer Second Avenue Railroad, New York City, attributes the fact that this company

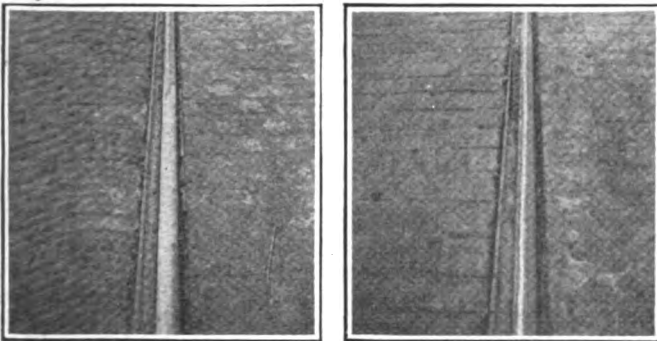
has no corrugation on its tracks to the use of cast iron wheels instead of steel wheels.

R. N. Wade, engineer maintenance of way Chicago Rapid Transit Company, writes as follows in regard to corrugation on the elevated lines:

"As you know, all track on the elevated railroad is open track, and we have no trouble with rail corrugation except on the curves. This, I believe, is due to the combined motion of the wheels slipping and the trucks slewing; that is, moving backward and forward in the throatway between the restraining and the run-



Corrugation in New Bedford Is Removed by Welding on New Metal



At Left, the Welded Strip Is Ground Down Smooth, but the Metal of the Original Rail Is Not Touched.. At Right, the New Metal Is Laid $\frac{1}{2}$ In. Back from the Gage Line

ning rail. This is also due to a certain extent to the application of power on the curves.

"Most of our curves wear out due to corrugation, but we do not grind them, as we have found it is cheaper to renew the rail. When the rail becomes so badly corrugated that it is noisy and the trains ride over it uncomfortably we take it out."

BUILDING UP CORRUGATED RAILS BY WELDING

A most interesting treatment of the problem of removing rail corrugation is that recently brought to light by the visit of a JOURNAL editor to the New Bedford Mass., property. T. W. Williams, engineer maintenance of way Union Street Railway, makes a practice of building up badly corrugated rail by welding, thus giving it a new tread. This is done with an Indianapolis welder.

Three seams of metal are welded to the tread parallel to the length of the rail, the nearest being $\frac{1}{2}$ in. from the gage line. The rail must be clean when the welding is done and care must be taken to keep away from the gage line. If the latter is not done, the welding material is likely to spatter and spoil smooth-

ness of the gage edge. After the head of the rail has been built up by welding on these three strips the surface is partly ground down again. The grinding, however, is not carried to a point where the original metal of the rail is affected.

After having been treated in this way, the rail surface is good for one and a half to two years service before new corrugation develops. Hard steel electrodes are used and it has been found more advantageous to do the work in hot weather because of the unequal contraction which afterward occurs if the welding is done during cool weather. The corrugation with which the New Bedford company has to deal is principally at points where the cars are braked for a stop.

Nearly every one has his own theory of the cause of corrugation, but the method of avoiding corrugation employed by J. M. Mudie, chief engineer Detroit United Lines, seems to be as dependable as any. He says: "I am frank to admit that none of my theories regarding the cause of corrugation stand up under all conditions, and I am inclined to believe that keeping one's fingers crossed is about as good a method as any of avoiding this trouble."

EXPERIENCE OF A TRACK CONSULTANT

Drawing upon the experience of H. P. Hevenor, consulting engineer, New York, who has had an extensive consulting and contracting experience in connection with electric railway track, we get a somewhat broader view of the subject. His experience with respect to corrugation covers rapid transit lines where multiple-unit trains are operated; railroad tracks where the service involved multiple-unit trains, electric locomotives, and steam locomotives, and surface street railways both in paved and open track. His observations follow:

"It has been my experience that corrugation occurs most on surface lines of girder rail and wood tie construction with concrete paving base between the ties and a block form of pavement. On girder rail I have seen lengths of corrugation vary from 2 in. to 8 or 10 in. On T-rail I have never seen corrugation run less than 3 in., with an average of about 4 in. Under multiple-unit operation corrugation very seldom runs less than 6 to 8 in.

"I have never found any direct relation between wheel diameter and length of corrugations other than the difference in lengths of corrugations under trolley use and multiple-unit operation. There is a definite relation between corrugation and the number of wheel passes. When corrugation once starts it is only a question of the number of wheel passes before it becomes pronounced and eventually destroys the rail and the entire track assembly, including the paving adjacent to the rails.

"Development of corrugation has usually been brought to my attention by the depreciation of the track structure or the adjacent paving. But complaints from adjacent residents have also been a source of information as to the condition. In one instance, where a multiple-unit operation was used in an open cut, the jarring of the cars operating over track damaged by corrugations shook an entire house and broke glassware in the house.

"There is only one real method for properly removing corrugation and that is by means of what is known as a reciprocating grinder which gives a true planing

action on the top of the rail. I believe that removal of corrugation by means of a grinding wheel may remove the heavy corrugation, but it leaves a great number of microscopic cups, which in due time, under a sufficient number of wheel passes, will cause corrugation to recur. The reciprocating grinder is slower than the rotary grinder, and of course the time required for removing is dependent upon the depth of the corrugations.

"The cost of grinding will vary considerably with the chemical analysis of the rail, whether girder or T-rail, the width of the head or rail tread and the depth of the corrugations. The cost of removing corrugations by means of a reciprocating grinder usually is greater than by means of a grinding wheel, but there is no comparison in the value of the work after it is completed.

"Corrugation should be removed as soon as it can be visibly detected or identified, or before it has had an opportunity to loosen or harm the track assembly or the adjacent paving. It will absolutely destroy the track structure and the adjacent paving long before normal depreciation. I might also add that corrugated track is very hard on rolling stock, and the noise caused by corrugation is very annoying to passengers as well as the people living in the vicinity.

"If corrugation is properly removed in its early stages it oftentimes will not recur in the life of the rail; but if it is allowed to get to any depth, say to $\frac{1}{8}$ to $\frac{1}{4}$ in. in paved track, by removing the corrugations it will save the paving and track assembly for a few years, when it will most likely need to be gone over and the corrugation again removed. The cost of removing corrugation is so trivial compared to the cost of replacing the structure that the work is well warranted. However, in open track structure, it is my belief that when corrugation reaches this stage the rails should be replaced because of the harm done to the track assembly, thereby increasing the maintenance and the risk of derailment.

"Unquestionably, all metal removed from the top of the rail, in addition to that of normal wear, will have a tendency to decrease the life of the rail, but if this rail has corrugations on it, it will naturally add to the life of the rail to remove the corrugations. On the old deduction that the life of the joint is the life of the rail, the small amount of metal required to be removed to eliminate the corrugation in its early stages is not likely to have any effect on its future life.

SOME OBSERVATIONS FROM HEAVY TRACTION EXPERIENCE

"I have found that corrugation is oftentimes introduced at and adjacent to station stops due to the heavy braking and the quick acceleration of trains. The electric locomotive does the least harm to the rail in this respect, the steam locomotive the most harm at the point of acceleration due to slipping of the wheels, while multiple-unit trains are a source of complaint from the entire territory in which they are operated.

"The causes of corrugation have been the source of considerable controversy, but I feel that most authorities will agree that it unquestionably comes from narrow track gage in most instances. It has been my personal observation that the single-truck safety cars are also the means, at times, of starting corrugations. Whether this is from the rigid wheelbase of the single

truck I am unable to say, but I feel that this source should be watched by different men throughout the country. In another instance I found that corrugation started very quickly on one type of T-rail. A micrometer was used on an unused rail of this type and slight variations were found in the top of the head of the rail, after machining the base to a true plane. This may have been an exceptional case or it may exist in a number of instances.

"Corrugation in street railway construction has often been looked on as being more prevalent in the rigid type of track construction than in the flexible type of track construction, both in paving. I believe, from my own experience, that the rigid track construction will have less corrugation than the flexible.

"If corrugations are permitted to become of any excessive depth before they are removed, and are then planed to a level surface, the early recurrence of corrugation in this rail is due to the difference in the density of the metal as the steel is more compacted at the hollows than at the high spots. It might be an interesting research to find out the amount of compacting received by the rail at different depths of corrugation."

BRITISH CONCLUSIONS

In bringing together some discussion of the corrugation situation as it exists today, it may be well to include the conclusions of the Municipal Tramways Association of Great Britain. The final report of the sub-committee on rail corrugation dated April 29, 1921, confirmed the conclusions reached by the same committee in 1914, after extended additional study. These conclusions comprised experiments with rail supported in various ways to reduce the vibration. The conclusions follow:

1. Corrugation takes place on all rails under observation, varying only in degree and pitch.
2. On most rails corrugation is accompanied by pitting or crumbling, varying from a slight to a marked degree. This pitting appears most where corrugation ceases to develop cumulatively and in regular ridge and hollow form.
3. The pitting or crumbling appears to relieve the superficial molecular stresses induced by the causes of corrugation, and thereby eradicates, limits or modifies corrugation.
4. Corrugation occurs in ordinary grooved rail and on bull head rail and on rail with or without specially secured lateral stiffness and rigidity.
5. Differences in freedom of the rail for lateral vibration are not accompanied by any corresponding differences in either the occurrence or the severity of corrugation.
6. The corrugation of the Zell-treated rails did not differ appreciably from that of other rails.
7. Persistent corrugation occurs on straight lines where the slippage is least and where it is therefore least likely to be a contributory cause of corrugation.
8. Corrugation is removed at or near stopping places by magnetic brakes as fast as the cause of its origin tends to its production.
9. The corrugation of the tracks considered by the committee appeared in definite form on railways, such as the Metropolitan District, whereon the rails are of different form and differently fixed.

A further finding of the committee in its final report was that "corrugation of steel rails is inseparable from the action of the heavily loaded wheels rolling along the surface of the tread of rails, and this rolling originates the corrugation by giving rise to superficial stresses in the material of the rail tread, which are in excess of the elastic limit and of the toughness of that material."

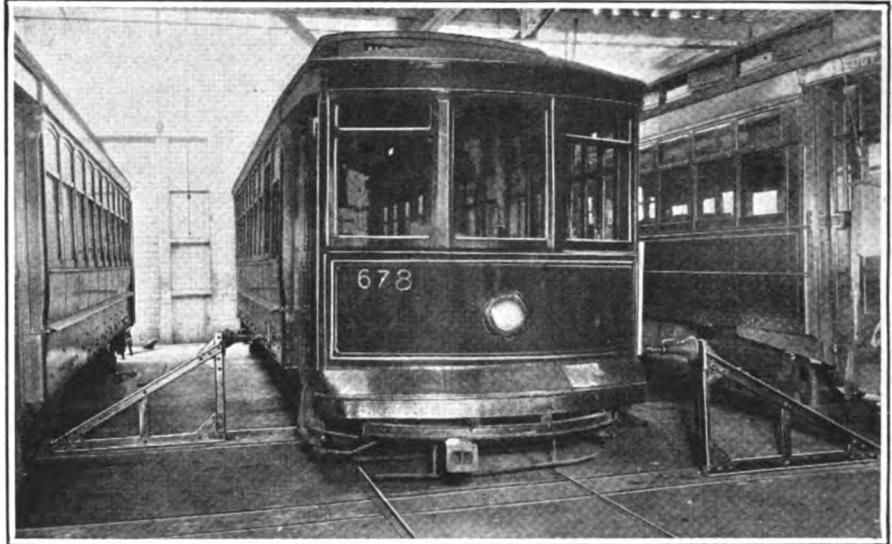
Equipment Maintenance Notes

Car Straightening Device

WITH the increased use of steel side sheets and steel underframing for electric railway cars has come a demand for convenient equipment to assist in straightening bent sides and ends. These become twisted, warped or crushed out of shape from collisions with trucks or other cars, and if the bending is not too extensive it is most convenient to straighten out the bent portions without cutting out the steel sheets or understructure. A few railways have provided special straightening construction and equipment for taking care of this work, but the majority have no special facilities. On many roads it is quite common to bring the car in between two brick walls or between two iron columns and then apply jacks for straightening out excessively bent portions, while other parts are hammered out, if possible.

A special construction used by the Northern Ohio Traction & Light Company was described in the *ELECTRIC RAILWAY JOURNAL* for Feb. 2. The accompanying illustrations show a very simple, strong and portable equipment which is used in the shops of the Capital Traction Company, Washington, D. C. This construction makes use of anchorage beams installed in the floor of the shop. Jack braces are provided which can be placed in position by hooking the foot lugs at the bottom of these braces into slots in the concrete anchorage beams. The straightening of the bent part of the car is then carried out by means of screw jacks which are placed between the jack braces and car body.

In the shop of the Capital Traction



Straightening a Car Body in the Shops of the Capital Traction Company

Company four anchorage beams are provided. These are of concrete 1 ft. 4 in. wide and 2 ft. 6 in. deep. The concrete is reinforced by $\frac{3}{4}$ -in. and 1-in. round iron rods which have hooked ends. Iron plates are also provided to receive the hooked portions of the jack braces. An accompanying illustration shows the construction of the anchorage beam and also details of the jack brace construction.

The jack brace is made of 3-in. x 3-in. x $\frac{1}{8}$ -in. steel angles riveted together and having gusset plates at the corners and a crossbrace between the top and bottom members. Each brace is provided with two hooks at the bottom to fit into the plate of the anchorage beam and hold the brace firmly in position, when pressure is applied.

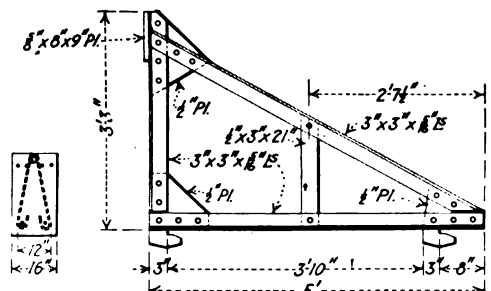
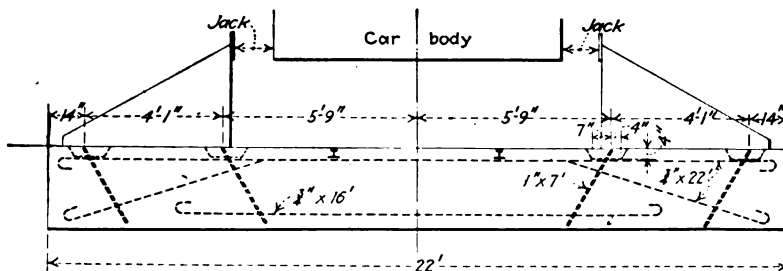
The method of applying pressure and straightening a car is illustrated by the accompanying photograph.

A particular advantage of this construction is that the jack braces can be placed in position and removed very easily, so that the entire floor area is available for other work when the straightening work is not being carried out.

Plug-Cutting Bit for Finishing Screw Holes

AN ATTEMPT is being made at the Throop Street shops of the Chicago Rapid Transit Company to eliminate from the interior trim of the car all screwheads by counterboring the head and placing a wooden plug of the same material as the trim on top of the screwhead. Thus on the side posts, wood panels and end panels of the car no indication of the screws which hold the wood to the steel framing mar the finish of the trim.

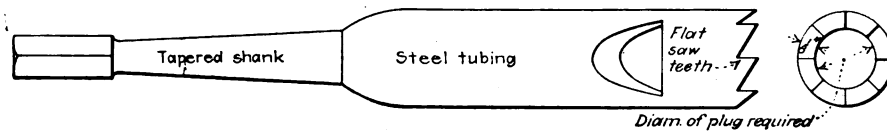
To obtain the necessary plug from



Details of Anchorage Beam and Jack Brace for Car Straightening

a piece of material of the same character and grain it was necessary to devise a plug-cutting tool which would turn these plugs out at a rapid rate and at the same time have them accurate as to size. In the

about $\frac{1}{2}$ in. from the saw tooth end in order that a small drift may be used to force the plugs out of the tool should they become lodged in there during the process of cutting. It has been found advisable to make



Details of Plug-Cutting Bit for Finishing Screw Holes

construction of this tool, or bit, a piece of steel tubing whose inside diameter corresponds to the required diameter of the plug is securely fastened to a taper shank which will fit conveniently into the drill press or horizontal wood drill. The other end of the steel tubing is serrated by hand into a number of flat teeth. A notch is made in the steel tubing

these bits out of $\frac{1}{2}$ -in. stock and to have three or four sizes on hand which will cut plugs for the majority of screwheads. Forty plugs per minute may be cut by one man operating one of these tools, and it is the practice to make up a couple of hundred plugs at a time in order that the woodworkers will have an ample supply for a period ahead.

Notes on Modern Armature Repair Practice*

A Number of Methods Are Discussed that Make for Good Repair Work on Windings, Brushes and Bearings—High-Voltage Testing of Windings Desirable

BY JOHN S. DEAN

Westinghouse Electric & Manufacturing Company

THE armature winder should be provided with proper tools, including a rawhide mallet, steel and fiber drifts, screw driver and scissors. Improper tools in the hands of the average winder may result in a poor winding job. Best results can only be obtained by using armature coils made from a good quality of copper, insulated with high-grade fibrous material or a combination of fibrous material and mica wound to correct shape, with insulation reinforced at cross-overs and corners, and thoroughly treated by dipping and baking in a high-grade insulating varnish.

All sharp corners and roughness in the slots that might damage the windings must be removed by filing or by grinding with a small portable emery wheel. The insulating material placed on the coil support should be evenly spaced to avoid any thin spots. The coils should have a snug fit in the slots and should be laid in so that their tops extend about $\frac{1}{2}$ in. above the band grooves. This is important to get a good banding job. In winding the coils they should not be twisted, bent or otherwise abused. Insulating or protect-

ing pieces should be placed at all points where coils cross and where there is danger of short circuiting.

In soldering the leads to the commutator the iron should preferably be held on the side of the commutator rather than on the top, and the pinion end of the armature raised 6 or 8 in. This procedure tends to prevent solder running back of the neck and short circuiting adjacent bars. If the armature coil leads are well tinned, experience has shown that it is not necessary to tin the commutator necks. An acid flux will tend to weaken the fibrous insulating material on the windings and should not be used. The best practice in soldering is to use a high percentage tin base solder for wire-wound armatures and pure strip tin for those that are strap wound.

DIPPING AND BAKING

On many roads, armatures are partly banded and then heated twelve to twenty-four hours, depending upon the size, and dipped, pinion end down, in a good grade of black insulating varnish. After draining they are baked at a temperature of from 95 deg. to 105 deg. C. for forty-eight to seventy-two hours depending upon the size. This treatment fills the crevices in the armature and

acts as an effective bond to prevent vibration.

Best results in banding armatures are obtained by drawing the windings down in place by temporary bands after they have been heated. For the final bands a good grade of tinned steel banding wire, ranging in size from No. 14 to No. 17 B. & S. gage, with tensions from 100 to 350 lb., is best. Phosphor bronze wire is used for bands by some operators, but the following comparative test results show plainly the superiority of the steel for this purpose:

	Ultimate Strength, Lb.	Elongation, Per Cent
High grade steel.....	267,000	36
Phosphor bronze	157,000	15

Strips of tin placed under the core bands tend to strengthen and make them less liable to work loose in service. Bands should be soldered with pure tin as it has a higher melting point than the half-and-half solder.

TESTING ARMATURE WINDINGS

On a number of properties repaired armatures are given an insulation test of 600 volts, through a bank of lamps connected to the trolley circuit. This test is not severe enough to weed out the defects in the winding due to poor material and inferior workmanship. A railway shop should be equipped with a high-voltage testing box. All newly wound armatures should be tested at 2,000 volts to ground and repaired armatures at 1,000 volts.

FIELDS AND BRUSHES

To insure the proper speed of the motor, the field coils must have the correct number of turns. The wound coils should be carefully insulated and thoroughly impregnated with a high melting point asphaltum gum. This treatment produces a coil that will best resist heat and moisture. Revamping old field coils by burning off the old insulation and reinsulating should only be done under careful supervision, as there is danger of damaging the copper. A 30 per cent increase in the resistance of a revamped coil was reported by one master mechanic, which in his estimation was due to burning the copper when the coil was heated to remove the old insulation.

It is considered best practice in connection with modern motors, and is also recommended for old motors, to use cables coming out from the body of the coil instead of the heavy brass terminals, which are more

*From a paper read at the meeting of the Midwest Electric Railway Association, Springfield, Mo., Jan. 17, 1924.

likely to break off, due to vibration, or to develop loose connections and burn off the leads. Another objection is the difficulty of properly insulating the terminals after the connections are made. Field coils mounted in the frame should be spring-supported, to keep them tight on the poles and prevent vibration and chafing. As a precaution it is advisable to test the polarity of the coils after they are assembled in the frame.

To improve the operation of brush holders, keep the porcelains clean, the shunts in good repair, the mechanism working freely and spring tension approximately from 6 to 9 lb., depending upon service conditions. Brush holders with a single carbon per box are more likely to give trouble than those using split carbons, due to reduced spring pressure, by having the circuit broken at the brushes, with resultant tendency to flash. Brush holders should be properly aligned on the neutral position, usually at the center line of poles, adjusted about $\frac{1}{8}$ in. from the surface of the commutator, and spaced around commutator one-quarter of the number of commutator bars on a four-pole machine. The general feeling is that brush holders that need repairs or adjustment should be replaced by others in good condition and the defective ones sent to the shops.

The use of high-grade carbons more than pays in the form of increased life of brushes and commutator and improved operation of the motor. Carbons should have a snug sliding fit in the boxes. They should not be copper plated as the plating is liable to peel off and jam the carbon. Shunts on carbons are not necessary as the modern brush holders have the shunt as a part of the brush holder pressure finger. The average life of carbon on non-ventilated motors is from 40,000 to 50,000 miles, while from 8,000 to 10,000 miles is a good average on ventilated motors. This comparative short life of carbons on the ventilated motors is due to rapid side wear of the carbon, caused largely by the action of the dust and dirt drawn through these motors. A number of operators are using a single carbon per holder instead of the split or double carbon and reports indicate that they show less side wear on ventilated motors and give a higher mileage. This scheme shows a decrease in the cost of carbons per holder of about 15 per cent; further, they are more easily renewed, hence

are favored by the carhouse men. On the other hand, the single carbon tends to wear uneven on the end and is more likely to jump off the face of the commutator and cause flashing of the motor.

BEARINGS

The tendency of present-day practice is to use bronze armature bearings lined with babbitt and plain

unlined bronze axle bearings. In the manufacture of bearings a high grade of bronze alloy should be used and great care and attention should be paid to the details of the various manufacturing operations. Armature bearing shells should be carefully tinned and lined with a high-grade tin base bearing metal. They should be given from 0.008 in. to 0.010 in. initial clearance and be pro-

Dick Prescott Goes to Work and Gets a Chilly Reception

WHEN Dick reported for work the next morning after having been so abruptly hired by Thomas Mulaney, the general foreman, he wore clothing that he thought would be suitable for the rough work as a carpenter's helper which he agreed to take when he was told that the shops of the Consolidated Railway & Light Company did not have an engineering department. In addition, he carried under his arm a small roll containing a suit of overalls.

After punching his time-clock number he followed the instructions given by the timekeeper and started out to find Steve White, the carpenter foreman.

When he entered the door of the little office, built into the corner of the carpenter shop, the round-shouldered, slightly built man who sat before a small battered desk was busy sketching on a pad of paper.

"Are you Mr. White?" asked Dick as the man at the desk looked up.

"Yes. What can I do for you?"

"The timekeeper told me to report to you," said Dick.

"Oh, you're the new helper the boss hired yesterday. Say, just sit down over there for a few minutes until I get this sketch finished and I'll be right with you."

Dick sat down on the makeshift chair indicated, and waited for several minutes in respectful silence. A boy perched in front of a small window opening into the shop was busily handing out job tickets to a number of heavily clad men who stared curiously at Dick as they called out their numbers.

"George," said the man at the desk, suddenly tearing off the sheet on which he had been working from the rest of the pad, "take this sketch right over to old man Johnson in the mill and tell him to make up six pieces like that right away. Tell him we've got to get that car out tomorrow afternoon."

As the boy departed, White turned to Dick.

"Now, young fellow, got any tools?"

"No, I haven't," said Dick. "I thought it would be better to get your advice on what I would need."

"Well I guess you can get along today all right."

Just then the carpenter foreman caught sight of the small bundle under Dick's arm.

"For the love of Pete! That's not all the clothes you brought?"

"Why-y, yes; I have a pair of overalls here and I thought that would be all I would need."

"Overalls! Say, young fellow, what you need here is some over-shoes! You can't work in this shop in that outfit—you'll freeze to death. You need some good heavy clothes to wear under your jumper, and some heavy gloves. This shop's as cold as an ice house."

"I'm mighty sorry, Mr. White, but I'll have everything I need in the morning. I thought my overalls would be plenty warm enough for work inside."

"That's the way it ought to be, but I haven't had any luck convincing the old man. I lost several good men this week because we couldn't get more heat. We'd save money by enlarging the heating plant 'cause a man can't do good work all bundled up. But just the same we've got to make the best of it and you'll have to bring down some heavier clothes tomorrow. You can give George a hand in the office today and help him get his time records up to date."

In the meantime, George, the clerk, had found old man Johnson in the mill and handed him the hurriedly made sketch.

"Steve wants to get them made up right away. Says they gotta get that car out tomorrow."

"Yeh? Det ban same story ever' time; hurry, hurry, hurry. Den nutt'n come right. How many pieces he want?"

"Why, I guess he said four pieces."

Still muttering under his breath, and not stopping to question the boy further to investigate the accuracy of his statement, old man Johnson started toward the lumber pile.

(To be continued next month)

vided with ample oil grooves, properly located. At least one of these grooves should extend to the radius at the bearing flange to supply oil to the rubbing surface between the bearing flange and the wiper ring. These bearings should have approximately 3 to 5 tons press fit in the housings and in addition should be held by a key. Axle bearings should be given from 0.012 to 0.016-in. initial clearance. It has been found by experience that oil grooves are not essential. The bearings should be a tight clamping fit in the bearing seat and in addition should be provided with dowels or keys. Two end dowels in the bearing flange and one body dowel have proved very effective and are used in connection with some of the more modern motors.

The shells should be cleaned thoroughly before babbitting. Bronze shells that are to be lined with babbitt should be well tinned. Malleable iron shells can be tinned by first pickling the shell in a weak solution of sulphuric acid. A good tin base metal is preferred for babbitting lining, although a lead base metal has been used successfully. The latter requires extra care and attention to get good results. The bearing shell and mandrel should be heated before babbitting. The metal should be poured at a temperature of from 460 to 480 deg. C. This is best accomplished by equipping the babbit pots with an automatic temperature control to keep the temperature of the metal within the specified limits.

Heat-treated axle steel and alloy steel shafts used in modern railway motors have given good results in service, and these materials are recommended for use on the older motors now using plain axle steel. Tests show that axle steel heat-treated is 44 per cent stronger than untreated axle steel, while the alloy steel is 77 per cent stronger. In addition, either material is more uniform in strength than untreated steel, is tough and fatigue-resisting, and will increase the shaft's operating factor of safety. Fillets must be provided at all changes in diameter. At the end of the pinion taper a large fillet is now commonly used in connecting with a shortened pinion key-seat. It is the practice on armatures using a spider to leave the key off and to depend on the press fit of the shaft in the spider. By thus omitting the key-seat in the shaft increased strength is obtained.

A number of operators believe that loose laminations on cores are

largely responsible for broken armature leads. The older railway motor cores were built up with laminations that had a loose fit on the shaft or spider, and in the case of the spider construction were held in place by a ring key. The laminations on modern motors are now made a tight driving fit on the spider or shaft, depending upon the construction, and are forced down in place by means of a special air-operated cylindrical plunger type hammer. The ring key has been replaced by a ring nut to hold the laminations together as this design is more reliable.

Effective Hose Bridge

STREET car companies have difficulty in laying hose across streets because of objections due to traffic blockades and frequent damaging of valuable lengths of hose. The Market Street Railway, San Francisco, is



An All-Metal Hose Protector for Track Gangs

now using a bridge which is built of two wrought metal strips, tied together with iron straps that are also made of drawn material. The straps are curved to bring the long metal strips into an arch. Vehicles can run over the protector with little jarring and without injuring the hose.

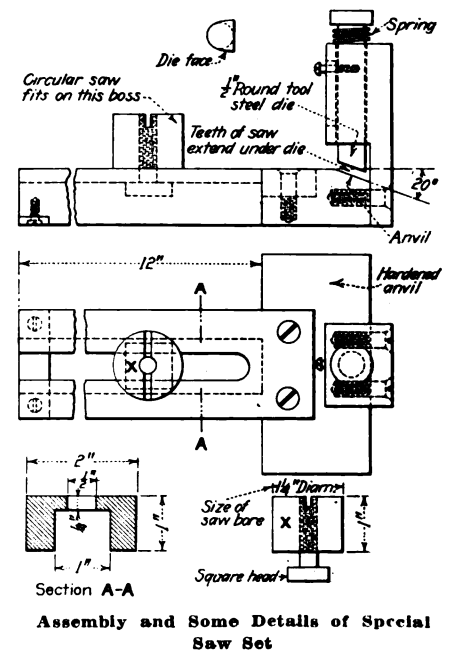
Special Tool for Setting Circular Saws

AN INGENIOUS device has been made and is used in the Throop Street shops of the Chicago Rapid Transit Company for rapidly and accurately setting the teeth on heavy circular saws. By employing a blow instead of a leverage pull to deflect the tooth the desired amount, it is claimed that a more accurate setting is obtained in a shorter time than

was the case with the ordinary hand saw set. Fundamentally, the device now used consists of a center to hold the saw, an anvil beveled to the proper angle and a die of the proper design arranged to strike the beveled portion of the anvil when actuated by a blow from a hand hammer.

The construction of the device is of mild steel with the exception of the anvil and die, which are hardened tool steel. The anvil portion is 1 in. thick, of rectangular shape, and measuring 2 in. x 4 in. Attached to one side is the guide for holding the boss or center upon which the saw revolves. The other long edge of the anvil is beveled 20 deg., forming the portion of the anvil on which the saws are set. An upright die holder or guide is fastened to the vertical face of the anvil piece by means of countersunk machine screws. The die is of tool steel and is cylindrical up to within $\frac{1}{4}$ in. of its face, which is semi-circular. This design gives a wide face to the die near the ends of the teeth, thus aiding in bringing them down to shape. A set screw in the die slides in a slot and prevents the rotating of the die, while a small compression spring located between the head and die support returns the die to its position after being depressed by the hammer blow.

An adjustable feature has been introduced in the manner of fastening the boss or center. A slotted



undercut guide accommodates a square-headed bolt, while the boss is threaded and acts as a nut in holding the bolt in any desired position. This boss for the particular saws used measures 1 $\frac{1}{4}$ in. in diam-

eter and was made 1 in. long in order to prevent the saw from jumping off when struck during the setting operation.

In practice, a saw is placed on the spindle and adjustments made so that the teeth will extend over the beveled anvil. Often the die support is used as a guide, bringing the ends of the teeth up to the support, but experience is the only guide for placing the saw. Alternate teeth are brought under the die and a blow is delivered by a hand hammer. Here

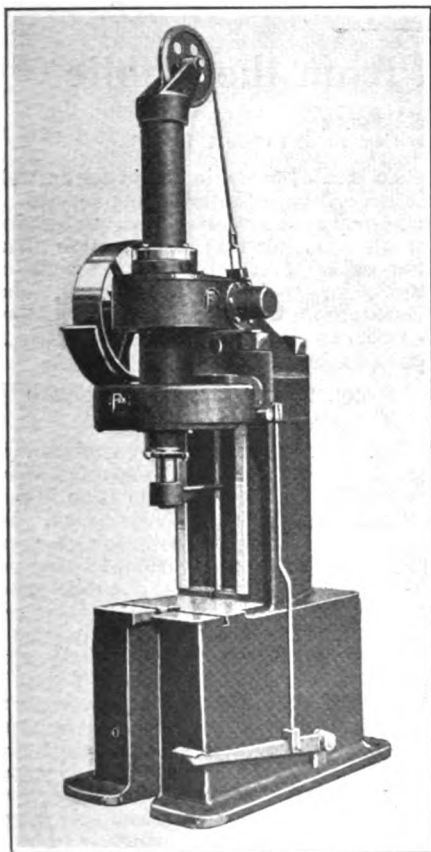
again experience will dictate the number and intensity of the blows. After every other tooth has been set in one direction, the saw is inverted and the remaining teeth set.

In setting a No. 12 gage, 18-in. circular saw this device required the services of one man for about three hours, as compared with several days time for the old method. The accompanying illustration indicates the general dimensions and construction of the device, which may be used for saws having diameters up to 22 in.

New Equipment Available

New Screw Type Power Press

TO MEET the demand for a flexible power press, so that varying pressures can be applied and regulated without difficulty, the Fox Machine Company, Jackson, Mich., is placing a new line of power presses on the market. These are built in



Flexible Power Press

four sizes, with capacities up to 5, 10, 20 and 30 tons, respectively.

A power press in an electric railway shop is a very convenient tool,

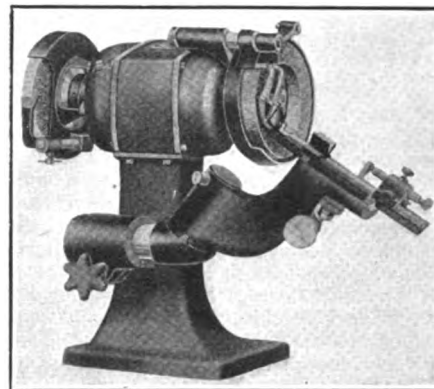
as in addition to the work of pressing in bearings and bushings a press finds ready use for straightening shafts and bent bars, pressing mandrels into work that must be turned in a lathe, broaching babbitted bearings, and assembling various parts where pressure is required. With these new machines the work is placed on a table and the depressing of a pedal causes the ram to travel down at a rapid rate until it comes in contact with the work, after which the pressure applied can be regulated by the pressure on the pedal. When the pressure on the pedal is released, the ram returns to its initial position.

The base of the machine is of heavy construction, with a slot down the front of the base under the center of the ram. This permits flanged shafts, etc., to be placed on the work table. The ram is made of high manganese chrome alloy steel, having a tensile strength of 135,000 lb. The ram has a quadruple thread of coarse pitch and two opposed splined keyways for drive in rotation. The nose of the ram has a hardened steel thrust cap, and also a special nose piece is provided so that a variety of different tools can be used at the end of the ram.

Pressure is regulated from the pedal through connection to a raybestos-lined band brake. Pressure on the pedal brings friction to bear on the band brake drum, thus arresting the rotation of the drum. When the ram comes in contact with the work, the pressure on the band brake regulates the slippage of the drum and thus governs the pressure of the ram against the piece placed on the bedplate.

Direct Connected Twist Drill Grinder

A BENCH type twist drill grinder made in three sizes is being marketed by the Gallmeyer & Livingston Company, Grand Rapids, Mich. The smallest size is suitable for drills from No. 60 to $\frac{3}{8}$ in., the second size for drills from No. 52 to $\frac{1}{2}$ in. and the third size from $\frac{1}{2}$ to $1\frac{1}{2}$ in.



Bench Type Twist Drill Grinder

The small machine is equipped with a $\frac{1}{2}$ -hp. motor and the larger ones with $\frac{3}{4}$ -hp. motors. The grinders carry 8 $\frac{1}{2}$ -in. diameter grinding wheels, which run at 1,750 r.p.m.

The spindle of the grinder runs in high-grade ball bearings and is made of 60 to 80-point carbon, hammered crucible steel. The swivel stud is 2 $\frac{1}{2}$ in. in diameter, with the bearing the full width of the column. The drill holder is designed so that either straight shank or taper shank drills of standard type can be ground, and drills with enlarged shanks or drills mounted in quick-change sockets can also be ground with equal facility and without any changes or extra adjustment. The holder swivel bearing is 1 $\frac{1}{2}$ in. in diameter and 4 $\frac{1}{2}$ in. long.

The lip-rest of the grinder can be put on so as to use either edge for the drill support, and it can be reversed top or bottom, or to give four distinct settings. There is also an adjustment to provide for wear.

A diamond truing device is furnished as a part of the standard equipment. This truing device has a stop in the form of a track on a movable section of the wheel hood. As the diamond is advanced into the grinding wheel, this movable section of the wheel hood with its track is advanced an equal amount, so as to remain a fixed distance from the face of the grinding wheel. A circular stop on the front of the drill holder abuts against the track and rocks on it when swiveling the holder.

Association News & Discussions

New Englanders Discuss Welding, Economics and Public Relations

MARKED by noteworthy addresses upon public relations, engineering and economics topics, the program of the New England Street Railway Club's meeting at Boston, Feb. 7, attracted a large attendance and the close attention of representative traction men from all over the Northeast. President R. D. Hood occupied the chair. At the afternoon session R. L. Brown, New England manager Metal & Thermit Corporation, Boston, spoke on "Track Welding," J. B. Crawford, superintendent Concord Electric Railways, Concord, N. H., read a paper on "The Vanishing Railways" and C. Q. Richmond, general manager Berkshire Street Railway, Pittsfield, Mass., and Fred A. Cummings, assistant to the trustees Eastern Massachusetts Street Railway, Boston, spoke of pending legislative activities in Massachusetts. C. W. Kellogg, Stone & Webster, Inc., Boston, spoke on the A.E.R.A. regional committee.

Following the usual dinner at the Copley Plaza Hotel, addresses were made by F. E. Webster, vice-president and treasurer Massachusetts Northeastern Street Railway, Haverhill, Mass., on "Street Railway Accounting"; by Hon. Henry G. Wells, Massachusetts Department of Public Utilities, on "The Public and the Railways"; and by Rev. Dr. McIllyar H. Lichliter, Newtonville, Mass., on "The Spirit of 1924." The date of the annual banquet of the club was set for March 27 at Boston.

WELDING BY THERMIT DESCRIBED

Mr. Brown described the principles and application of Thermit welding and showed a large number of lantern slides from the Brooklyn Rapid Transit Company system illustrating the equipment and practice of this branch of maintenance activity. He pointed out that while the welding of locomotive frames is at present the largest application of the Thermit process, its use in track welding is extending so rapidly that in the future it is expected this will surpass the railroad shop development in magnitude. Recent improvements in the equipment include better facilities for preheating joints through the vaporization of kerosene. Ordinarily it requires from twenty to twenty-five minutes to heat the joint properly with a 7-in. rail. In the past two years the manufacturer has greatly simplified the operation of his equipment, reduced the amount of Thermit required per joint, and generally has speeded up production. Improved crucible designs have been put in service, and the No. 3 crucible now

lasts for forty or fifty reactions before relining is necessary. It can be tapped from the bottom, which is a great convenience. Thus far the Thermit process has been applied mostly to paved track, but some degree of success has also been attained in its use on exposed track.

L. E. Moore, Boston, pointed out the desirability of educating the public as to the real cost of operating private automobiles in and out of town. Omitting depreciation and other overhead charges, it costs at least 5 cents per mile to go and come from a point 8 miles out of town daily, or 80 cents per diem by automobile, often with a 50-cent garage charge added. For 30 cents round trip a commuter can go and come by rail. It was also brought out that by going into bus operation where conditions warrant it, the electric railway company can apply existing legislative rights of operation to

advantage. It was pointed out that a bill in the Massachusetts Legislature compels licensed motor buses to carry school children at half fare, and that this should be opposed by street railways operating buses.

REGULATION OF JITNEYS ON EQUAL PLANE WITH RAILWAYS

F. A. Cummings, Boston, and C. Q. Richmond, Pittsfield, urged that licensed motor buses be placed under the same regulative restrictions as electric railways, and that no jitney license should become effective until the department of public utilities had found that public convenience and necessity demand its use. At present jitney licenses from local authorities do not have to be approved by the commission. About twenty-six states now have legislation regulating jitneys through the state public service commissions.

President Hood urged the inclusion of track-mileage data in cost comparison information sent out by the association. He thought the admission of motor bus owners to the association would be helpful to members.

Getting a New Deal from the Public*

BY HENRY G. WELLS

Commissioner Massachusetts Department of Public Utilities

IT IS common knowledge that the public was antagonistic to street railway companies before the war. Of late years, however, the public has co-operated very largely in order that the companies might give reasonable service and receive a fair return therefor. What is the reason for that change of attitude?

In the first place, it would seem that there was very little attempt to cultivate public opinion when everything was running smoothly with the companies. Then came the war. Labor costs and costs of material increased tremendously. The public, with the old instinctive distrust, opposed any increases in rates. The regulatory bodies, because of that popular distrust, were very slow to act until the companies, particularly in this state, were rapidly approaching bankruptcy. Two of the largest roads in Massachusetts were in such condition that radical action had to be taken. Although every one assumed that private ownership of property, with public regulation, was better than governmental control and operation, yet the management of these two roads was placed under public trustees appointed by the Governor. As a result, the public woke up to the necessity of such institutions as street railway companies. They realized that

their cost of operation went up as well as everything else, and that service at a higher rate is better than no service at all. During this period more than 400 miles of street railway tracks in Massachusetts were abandoned, and those people who were left without any service realized the mistake of their attitude in the past.

PROBLEM IS TO MAINTAIN PUBLIC CO-OPERATION

Today the public is more sympathetic to the street railway companies than ever before. Your problem is to maintain that sympathetic co-operation. To do that it is necessary for you to analyze your own condition, to analyze the state of mind of the public with which you deal, to respond to their requests if possible, and, if not, by means of proper publicity to show them why such requests must be denied. Today is a day of readjustment and a critical period in the history of street railway lines. With the present state of the public mind there is no reason why the street railway companies cannot continue to function, give reasonable service and receive a fair return.

Too much must not be taken for granted because of the present condition of the public mind, however, for the peak of high prices has gone by and with every step taken in other lines of activity to reduce prices the public of necessity looks for a reduction in all

*Abstract of a paper presented at a meeting of the New England Street Railway Club, Boston, Mass., Feb. 7, 1924.

things. It must be clearly indicated that street car fares have only increased 45 per cent since before the war, and on a comparative basis there is still a margin between that and other costs. It should be clearly pointed out that the street railway companies have secured their increased fares at a much later date than any one else; and that, therefore, it will be necessary to be slow in readjusting or lowering such fares.

DIVERSIFIED SERVICE NEEDED

The street railway used to be considered a monopoly, but that is not true today. The automobile has cut down the revenue of practically every company in the state. No doubt that is why many of the lines have been abandoned, although possibly some of them ought never to have been built. There must be more variety in method of transportation. We have congested centers today where we need subways and tunnels, with trains of six to eight cars, and we have sparsely settled territory where bus lines as a supplement to street railway lines are necessary. So today the service is not all of one kind, and just so far as you men study these conditions and meet these varying changes in conditions, just so much easier it will be to maintain the public mind in a proper attitude.

The use of the one-man car has aided street railway companies in reducing operating costs. There would seem to be room for further use thereof by such companies as are in financial difficulties. Some opposition has been voiced to this type of car. Reliable statistics, not only in our department but gathered all over the country, indicate that these cars are operated, as a rule, more safely than the other types. With that fact established, it would seem that the only question left is whether or not some communities are to have service at all. In other words, there are many lines where the cost is such that one-man cars must be operated or none at all. With the public confronted with the alternative of the one-man car or no car, there would seem to be but one answer.

BUS CAN BE USED TO SUPPLEMENT CARS

There are thinly settled territories where even a one-man car does not pay but where a bus, running at reasonable intervals, would serve and would act as a feeder to the rail lines. Jitney competition with street railway companies has not caused as much trouble in Massachusetts as elsewhere and therein, too, the public's attitude has been helpful. All the more reason for street railway companies to study their territory carefully, with a view to utilizing such modes of transportation as are best suited to the territories.

At the other extreme, we have seen recently where a railroad line (the Shawmut Branch of the New York, New Haven & Hartford Railroad) is to be utilized for service by the Boston Elevated Railway. It is possible there are other thickly settled communities where there has been duplicate service by railroad and railway, neither one paying, and where the street railway company could take over the railroad right-of-

way, electrify it and operate it in a manner financially satisfactory.

OLD METHODS MUST BE DISCARDED

In order that the street railway continue with profit as an agency for the distribution of population in order to avoid congestion, and also serve many sparsely settled communities, old methods must be discarded. Just so well as you officials readjust yourselves to these conditions, just so well will you keep the public in a proper frame of mind. Do not assume that the present-day attitude is going to continue. Now is the time to hold it by a little special effort in your relations with the public. Do not assume they are always wrong. Doubtless you have formed the habit of turning down most requests. Even though you did not get the benefit of increased fares as soon as other prices went up, don't assume that anything and everything asked for means too much of a financial burden. Study it carefully from every angle before you decide, and then go over it thoroughly with the applicant, trying to make him understand it from your end.

It may be interesting to know that our principal complaints relate to service, heating (or rather lack of it), and cleanliness of cars. If the scheduled trips are satisfactory, the question of service is eliminated from the primary consideration of the executives. The rest is up to the employees. As to the cleanliness and heating, how much time do the executives spend with the employees on these questions?

EDUCATE EMPLOYEES AND PUBLIC

We have spoken of educating the public. Do you educate your employees? No doubt you feel you do spend time enough on such matters with your employees, but you cannot spend too much. The public judges a company by those with whom it comes in contact. The managers may have the best intentions in the world, but that would be easily nullified by those under them. How easy it is for the wrong type of telephone girl to antagonize the party at the other end of the wire. Of course the one calling is more or less "peevish," as a rule, and a little good nature at one end often alleviates the grouch at the other end. Don't answer a written complaint by a mere form letter. Have some one study or investigate and deal with it personally, if possible. It creates better feeling.

Educate the public as well as employees. True, many distrust the paid advertisements of public service corporations. We have seen one company, however, that avoided that by stating that the advertisements were paid for out of the receipts from street car advertising. Tell them facts, not arguments; give them figures easily understandable as to your financial condition, not a mere accountant's report; tell them your difficulties. Do these things regularly, not spasmodically. Do it now, not when conditions change and you want something.

After all, as one official said long ago, real publicity is what you do, not what you say. If the public gets service it is willing to pay for it. If the public is satisfied, it is easier for regulatory bodies to deal fairly and justly

with public service corporations. Street railway companies today need the co-operation of their employees and of the public. With that co-operation, regulatory bodies will be relieved of many of their troubles.

Track Bolt Committee Meeting

A MEETING of Sub-Committee No. 4 of the Sectional Committee of the American Engineering Standards Committee, which is dealing with the standardization of track bolts, was held in New York City on Feb. 5. A tentative design together with dimensions for standard track bolts was decided upon, and drawings and specifications will be prepared to be sent out to the various users for their criticisms.

Southwestern Utility Meeting

A JOINT meeting of the Southwestern Public Service Association and the Southwestern Division of the National Electric Light Association will be held in New Orleans April 22 to 25. The subjects will include development of public relations, interconnection of power lines, utility financing and engineering problems.

Utility Secretaries' Conference

ANNOUNCEMENT is made that a conference of secretaries of public utility associations will be held at the Hotel Sherman, Chicago, on March 25.

Illinois Utilities' Joint Meeting

THE annual joint convention of the Illinois State Electric, Gas and Railway Associations will be held March 26 and 27 at the Hotel Sherman, Chicago. A banquet will be given on the evening of March 26.

I.B.A. Public Service Committee

AMONG the committees appointed by President J. W. Prentiss of the Investment Bankers' Association of America is one on public utilities, with the following personnel:

Henry R. Hayes, Stone & Webster, Inc., New York, chairman; Eli T. Watson, Watson, Williams & Company, New Orleans, vice-chairman; James C. Willson, Louisville; Chester Corey, Chicago; Charles R. Blyth, San Francisco; Russell D. Bell, Montreal; C. J. Waddell, Philadelphia; John Esmond, Chicago; H. M. Addinsell, New York; Edgar C. Rust, Boston.

Day & Zimmermann Auditors Organize

AT A meeting in Philadelphia the auditors of the various properties managed by Day & Zimmermann, Inc., organized an association known as the Day & Zimmermann Auditors' Association. Officers elected were Melvin A. Miller, auditor Penn Central Light & Power Company, Altoona, Pa., president; W. C. Schoeppe, Alexandria, Va., vice-president, and L. W. Van Bibber, Springfield, Ohio, secretary and treasurer.

The News of the Industry

Akron Growing Restive

**Public Sentiment Is Strongly Against
Avowed Nickel-or-Nothing Policy
of Mayor Rybolt**

Following an injunction issued by Judge C. H. Wood, on application of the jitney bus owners' Association to prevent the operation of buses from outside points in Akron until they comply with the jitney ordinance, Mayor D. C. Rybolt announced that bus operation would not stop and that the court order would "make no difference in bus operation." The city, however, discharged practically all of its bus starters and they were later all hired by bus operators.

The Mayor announced on Feb. 14 that he would have a bus ordinance providing a straight 5-cent fare introduced at a special Council meeting held on Feb. 15 and that the Council would be asked to grant bus operators the right to run for a period of one or two years.

At a meeting of the City Council on Feb. 12 the Merchants' Association, the Chamber of Commerce, the Clearing House Association and various other organizations presented petitions to the Council asking the restoration of cars at a 6-cent fare for such period as was necessary to secure and submit to the people a permanent franchise for the operation of street cars and buses by the Northern Ohio Traction & Light Company.

WIDESPREAD DEMAND FOR SETTLEMENT

The City Hall was stormed with citizens who demanded that the cars be put back into service; several hundred persons were unable to get into the Council chamber. Resolutions presented at this meeting declared the existing conditions to be intolerable. The city claims to have 120 buses in operation, but checks which have been made by the railway and other interests show that the maximum number operated was sixty-nine. The service is practically no better than it was early in the month. Thousands of people are still walking to and from their work and in many instances workers are paying from 10 to 15 cents bus fare.

Edward S. Rose, Councilman from the Sixth Ward, has submitted an ordinance providing for a million dollar bond issue by the city for the purpose of having the municipality establish a bus system.

Merchants and other business men are still suffering from a decrease in business and advertising in the local newspapers has been cut 30 to 40 per cent.

Thousands of telephone calls are coming into the city and to the newspapers urging that the cars be put back into service, while all newspapers are carry-

ing many letters dealing with the subject. Most of these letters insist that the car service and the bus service of the Northern Ohio Traction & Light Company be restored. Very few of the letters indorse the Mayor in his effort completely to motorize the city.

No modern buses are being operated. Buses are in Akron, however, from New Jersey, Michigan, various towns throughout Ohio, Indiana and some from Illinois.

Terrific pressure is still being brought upon the Council by the general public to recede from its "nickel-or-nothing" policy and grant the railway a 6-cent fare with transfers.

Arguments were heard on Feb. 15 on the injunction to prohibit the fifty outside buses from operating unless they comply with the law. Reports that day were to the effect that some of the eight members of the City Council who have been supporting the scheme for complete motorization are becoming dissatisfied with the Mayor's failure to make good his pledges to furnish Akron the finest bus transportation system in the world. The proposal now is to pass a blanket bus franchise to no particular persons, fixing a 5-cent fare, and try to get companies to operate under it.

Transit Report Under Way at Boston

The report of the Metropolitan Planning Division, at Boston, created by last year's Legislature, has been filed at the State House. The division, which is part of the Metropolitan District Commission, was authorized to make recommendations as to the general transportation service and facilities in Boston and vicinity.

The report deals with three features of the general proposition: Transportation on the highways, by street railway lines, and the relation between railroad facilities and the steamship systems centering in the port of Boston.

In the matter of street railways the opinion is expressed that the carrying capacity of the existing subways in Boston can be doubled by making changes in the construction of platforms and by making other changes in construction.

Further the report says that where existing railroad tracks cannot themselves be utilized by the Boston Elevated Railway because of the need of steam railroads, it is entirely possible that elevated service can be carried on surface tracks parallel to the steam tracks.

The board says that it hopes during the coming year to prepare a comprehensive report dealing with the present facilities of the Boston Elevated and needed enlargements and extensions.

Interstate Will Pay Pensions

**Funds Are to Be Administered by Joint
Board, Representing Both Com-
pany and Employees**

Establishment of a service annuity plan for pensioning employees who have completed a certain period of service, was recently announced by the Interstate Public Service Company, Indianapolis. In general the retirement of men employees is at the age of sixty-five and of women employees at the age of sixty, but under certain conditions men employees may retire at the age of sixty and women employees at the age of fifty-five. All costs of the plan will be defrayed by the company. Administration will be by a board of five trustees, three of whom will be chosen annually by the board of directors from among the officers or employees of the company, and two elected annually by the employees from their own number.

Retirement on pension is obligatory for men employees at the age of sixty-five and women employees at the age of sixty, unless the board of directors, for special reasons continue the employee in active service without a service annuity. The rate in each case is 2 per cent of the average annual salary of the employee for the period of continuous service to the date of retirement, multiplied by the number of years of such service with the company, but the amount is not to exceed 50 per cent of the final annual salary or be more than \$6,000 per annum. Employees now in the service of the company and over the retiring age are to have their annuities computed on the number of years of service and thereafter have the same standing as at the retiring age.

PLAN NOW IN EFFECT

There is a provision by which the man employee who has reached the age of sixty while in service or a woman employee the age of fifty-five may be retired upon annuity upon his request or a request of his superior, if approved by the trustees, if he or she has been in the service of the company continuously for twenty years or more. In this case, the amount of annuity is determined by a sliding scale. Thus, the pension of a man at sixty years is 1.5 per cent of his average salary times the years of service, with a maximum of forty per cent of his final salary, and at sixty-four years the percentages are 1.9 and forty-eight respectively. Similar figures hold for women employees from fifty-five to fifty-nine years of age.

The pension plan was announced by special order dated Dec. 28, 1923. It was signed by Harry Reid, president, and went into effect Jan. 1, 1924, as noted previously in this paper.

Arbitration Suggested

Traction Company and Street Railway Are Unable to Agree on Reorganization

Arbitration of the differences between the Cincinnati Traction Company and the Cincinnati Street Railway was suggested after representatives of the companies reported to the street railroad committee of the Council of Cincinnati on Feb. 11 that they were unable to agree on plans for a reorganization of the electric railway system of Cincinnati. City officials, as well as members of the Mayor's traction committee and representatives of the Cincinnati Street Railway, expressed opposition to the arbitration feature, which was suggested by W. Kesley Schoepf, president of the Cincinnati Traction Company, in a statement read to the committee by Walter Draper, vice-president.

Mayor George P. Carrel urged the committee to recommend to the City Council that the city solicitor be empowered to proceed immediately to protect the city and the public. The committee took the suggestions of Mayor Carrel and Mr. Schoepf, together with the statements of the companies, under advisement. It is possible that the committee will call the companies together for a final attempt to bring about an amicable settlement before making its report to City Council.

FUTURE ACTION UP TO COMMITTEE

What action the city will take in the matter depends entirely on the recommendations which the street railroad committee will make. The city solicitor, it was said, can bring suit asking for a receiver for the Cincinnati Traction Company or the city can institute legal proceedings against the traction and street railway companies to abrogate the service-at-cost franchise. Regarding the latter procedure, it was indicated that it would involve years of litigation and much expense to the public, as the Cincinnati Traction Company could take the matter into the United States courts because it has stockholders outside of Ohio.

While the street railway company is willing to offer \$3,000,000 in its capital stock and other considerations for the return of the traction system, W. Kesley Schoepf, president of the traction company, said that the minimum his company would accept was \$6,000,000 in stock, although he was willing to arbitrate the matter. Mr. Hinsch and Mr. Dupuis offered Mr. Schoepf \$4,250,000 of the street railway's stock, which he also turned down.

Robert A. Taft, who, with Samuel Assur, represented the street railway at the meeting, informed the committee that there was nothing to arbitrate in view of the fact that his company in submitting its offer for return of the system based its conclusions on the earning power of the system. Mr. Taft further said the street railway company's offer involved the purchase of the leasehold interest of the Cincinnati Traction Company and the Ohio Traction Company in the street railway properties for \$7,468,328. In addition,

he said the railway company would give the traction company the buildings and ground now occupied by the Cincinnati Car Company and a reasonable amount of the ground now occupied by the Chester Park Amusement Company. The car plant and the ground occupied by the amusement company were leased, together with the traction system, by the street railway company to the traction company in 1901 for a period of forty-five years.

The street railway company, according to its offer, proposes to pay the \$7,468,328 as follows: Assuming and paying as of Jan. 1, 1924, first mortgage bonds of the Ohio Traction Company of \$1,570,000; \$600,000 face amount of notes of the Ohio Traction Company due on Oct. 1, 1924, and \$647,328 of additions and betterments not funded; assume and pay as they come due, \$1,651,000 face amount of the car equipment notes of the Cincinnati Traction Company. The foregoing items represent debts of the Ohio Traction and the Cincinnati Traction companies. In addition the street railway company will bring the traction company \$3,000,000 in par value, or 60,000 of its new shares of capital stock.

Committee Appointed to Study Subways for Pittsburgh

After a conference with Mayor William A. Magee of Pittsburgh, members of two planning bodies and representatives of the Philadelphia Company, the City Council of Pittsburgh voted on Feb. 1 to leave downtown subway and rapid transit matters for the present in the hands of a committee composed of Arthur W. Thompson, president of the Philadelphia Company and also head of the Pittsburgh Railways; Director Charles A. Finley of the city's Department of Public Works; Morris Knowles, chairman of the City Planning Commission; George S. Davison, member of the same commission, and Winters Haydock, chief engineer of the Citizens Committee on City Plan.

The committee of five was instructed to "study, investigate and report at an early date on the matter of a subway and all incidental matters pertaining thereto, and to report whether an expert engineer should be employed to study these matters."

Agreement on Bus Operation

The Eastern Massachusetts Street Railway has an agreement with the town of North Reading, Mass., by which the town will pay the company \$1,100 for the year 1924 to cover the cost of operating a bus line from North Reading Junction to North Reading Center dating from Jan. 6. It is estimated that the traffic revenue will come within this sum of paying the cost of the service for a year. The company operated a railway line to North Reading up to Jan. 6, but the trustees did not feel that the traffic on the line warranted rebuilding it. The townspeople agreed to contribute to the cost of operating a bus line. The regular cash fare of 10 cents is charged.

Construction of 60,000 Kw. Power Plant at Detroit to Proceed

The city of Detroit will start immediately to build a 60,000-kw. power plant to furnish power for the Detroit Department of Street Railways. Together with transmission lines, substations and distribution appurtenances the estimated cost will be \$11,611,000. The decision to proceed at once with the three-unit plant will result in the reduction from the originally planned four-unit plant with 80,000 kw. capacity at an estimated temporary saving of \$2,000,000 in cost. This it is believed will enable the plant to be built within the \$12,000,000 bond issue voted last April. It is expected that the plant will be ready to operate by Oct. 1, 1926.

It is the opinion of the officials that the existing interim contract with the Detroit Edison Company should be canceled and a new contract be drawn in accordance with the tentative proposal submitted to the acting Mayor under date of Jan. 28, 1924. The proposal as submitted is verbally revised to the extent that the Detroit Edison Company agrees to the original terms based on a minimum sale of 110,000,000 kw.-hr. a year, with the exception of the two tapering-off years. It is estimated the new Edison arrangement will save the Detroit street railways \$1,250,000 between Jan. 1, 1924 and Oct. 1, 1926.

The city's present needs are placed at approximately 240,000,000 kw.-hr. a year. The estimated output of the proposed new three-unit plant is 300,000,000 kw.-hr., and a fourth turbo unit may be added at any time. The first year's construction program will be financed by the sale of \$1,000,000 of public utility bonds. Steps will be taken at once to obtain the approval of the Public Utilities Commission for the proposed interim contract and to place the first \$1,000,000 of bonds on the market.

Wages Increased Four Cents

An increase of 4 cents an hour has been granted the trainmen employed by the Middlesex & Boston Street Railway, Newtonville, Mass., according to the award handed down recently by the board of arbitration. The award is retroactive to July 1, 1923, and will continue in force until June 30 of this year. The men were receiving 51 cents an hour and the increase brings the maximum wage for them to 55 cents an hour.

The wage question was one of six disputed points referred to the board of arbitration and was the only one on which the board found for the men. The demands for increasing the existing differential rate for operators of one-man cars to more than 5 cents an hour were rejected, as were requests for increased compensation for snow work, overtime pay for the miscellaneous men, and a reduction in working hours for carhouse men and miscellaneous men employed by the railway from nine hours in ten consecutive hours to eight hours in nine.

The board also rejected a request for a change in hours for platform work.

Work to Begin on \$900,000 Improvement Program

The Houston Electric Company, having won its fight against the use of jitneys, as noted in the *ELECTRIC RAILWAY JOURNAL* for Jan. 26, is preparing to carry out the conditions of the agreement reached by it with a committee of citizens.

On its part the railway company agreed:

To abandon its suit for an increased fare.
To route its lines in accordance with the Beeler plan.

To construct 4,200 ft. of single track, and 15,100 ft. of double track.

To speed up service.

To buy additional rolling stock and remodel present equipment.

To establish and maintain a bus line to the section south of McGowen Avenue and Crawford Street and extend it to Southmore as street pavements are completed.

To spend \$900,000 in the next three years on additional improvements not outlined above, such as the extension of present car lines and the establishment of new street car and bus lines to serve every part of the city.

To pay the cost of paving between tracks without contest.

The city agrees to these conditions:

To abolish jitneys.

To hire a consulting engineer to check improvements and extensions.

Both the city and the company agree to drop the injunction suit in the federal court in which the company sought a higher fare.

Public Relations Department Will Sell Service in Dallas

"Merchandising Service" is the central idea of the work of the public relations department recently created by the Dallas Railway, with C. J. Crampton, formerly superintendent of the safety and efficiency department, in charge. The department of safety and efficiency has been abolished and the safety work heretofore carried on by Mr. Crampton has been turned back to the operating department. This is in line with the company's policy of making safety a part of the job of every employee of the company and not an activity to be carried on by a separate department.

In the conduct of the department of public relations Mr. Crampton will employ newspaper advertising, street car advertising, billboard and screen advertising, newspaper publicity and will co-operate with the various civic and other organizations in the city, such as luncheon clubs, the Dallas Safety Council, mothers' clubs in the public schools, etc., and "sell street railway service, street railway good will and street railway transportation wherever he can."

More than \$2,000,000 for Detroit Improvements

A tentative program announced by the Department of Street Railways of the city of Detroit includes extensions, improvements and rehabilitation of street railway lines and equipment estimated to cost between \$1,250,000 and \$2,000,000. It is planned to commence the work in the spring and it is estimated that the extension program will take about two years to complete. It is planned by the commission to spend such amount of money as is

made available out of the \$5,000,000 bond issue voted by the electors of Detroit last April, and at the same time continue financing its rehabilitation program from the earnings of the system. As approximately \$900,000 is available annually for rehabilitation purposes, the total to be spent during the next two years, including amounts from bond sales and earnings, will approximate \$3,000,000.

Twelve new lines or extensions are proposed, the most of which will be extensions into new city territory not now served by the street railway lines. Plans for the track extensions have been completed and only the Mayor's and the commission's approval are needed.

Arbitration of Wage Increase Demanded in Atlanta

Local No. 732 of the Amalgamated Association has demanded arbitration of its request to the Georgia Railway & Power Company, Atlanta, for an increase of 25 per cent in the wages of trainmen in the employ of the company. The contract between the company and its men covering wages and working conditions expired on Dec. 31, 1923. When the request of the men was presented to the company it in turn submitted its financial statement to the union, showing that it was already losing money in operating its street cars and stated that it could not consider any increase in wages until additional income could be secured.

This made little or no impression upon the employees. They have insisted upon arbitration under the terms of the contract. C. Murphy Candler has been selected by the power company as its arbiter in the increased wage demand. The union has not yet selected its arbiter.

Articulated Car Goes to Detroit

The three-unit articulated car which is being built for the Detroit city lines at the Cincinnati Car Works will leave for Detroit Feb. 19 under its own power and will travel to Detroit over connecting interurban lines. It is scheduled to reach Dayton at noon and Lima at 5 p.m. on Tuesday. It will leave Lima at 8 a.m. Wednesday, arrive at Toledo at noon and Detroit 4 p.m. the same day.

The articulated unit has a length over all of 121 ft. and a seating capacity for 132 passengers.

Will Confer on Situation.—The Mobile Light & Railroad Company has requested the members of the Alabama Public Service Commission to visit Mobile and go over the railway situation with officials of the company. Recently the company asked the permission of the City Commissioners to discontinue its Michigan Avenue and Wilkinson Street lines. The company also asked of the city commission the right to extend certain lines.

Bill Reported Unfavorably.—A bill offered in the Maryland General Assembly providing that separate electric railway cars be furnished for white persons and negroes has been reported

unfavorably by the committee and the unfavorable report adopted by the House of Delegates.

Files Protest Over Paving.—Protest has been filed by Madison Railways, Madison, Wis., with Council in connection with a bill received from the city requesting payment of the company's share of the expense in excavation work completed in the railway zone on East Johnson Street. Dudley Montgomery, vice-president of the company, pointed out that a contract entered into between the city and his company on May 9, 1923, provides that the company is released from such obligations. The city maintains, however, that under the terms of the contract the company is bound to pay the entire excavation cost.

Two Resolutions Affect Baltimore Company.—The United Railways & Electric Company, Baltimore, has been made the target of two resolutions introduced in the Maryland General Assembly in session at Annapolis. One would authorize and direct the Public Service Commission to force the company to man all its cars with motormen and conductors and is a move against the one-man cars now used on some of the lines. The other would prohibit the collection of more than one fare within the limits of the city.

"Hail Columbia" New Magazine.—"Hail Columbia," a new magazine published by the Columbia Gas & Electric Company, described as "a monthly publication through whose pages the employees and friends of the Columbia Gas & Electric Company may obtain a broad view of its aims and accomplishments and become better acquainted with the underlying principles on which the company was founded," has published its first number, dated January, 1924. The opening issue contains a foreword by P. G. Gossler, president of the company, announcing the inception by Columbia of a customer-ownership policy. A map entitled "The Land of Columbia" shows the territory served by the Columbia operating companies. Among the properties which the company controls is the Cincinnati, Newport & Covington Light & Traction Company.

Other Dynamiters Are Indicted.—William H. Smith, Jr., who is under sentence of one year in the Erie County penitentiary and a fine of \$3,000 for conspiracy in connection with the dynamite outrage at Ellwood, N. Y., during the International Railway strike in August, 1922, has been indicted by the Niagara County grand jury on charges of grand larceny and burglary for the alleged theft of quantities of dynamite on Aug. 14, 1922, three days before the railway explosion. He pleaded not guilty when arraigned in County Court at Lockport and was held under \$10,000 bail for trial. Smith is now on bail pending an appeal to the United States Circuit Court of Appeals from the Federal court conviction for alleged conspiracy to violate the Sherman anti-trust law for alleged interference with interstate traffic. William VanDell, Lockport, a former employee, has been indicted by the county grand jury on similar charges.

Financial and Corporate

\$679,632 Gain for Boston Elevated

Road Has Largest Year in Points of Gross Receipts and Passengers Carried—Increased Labor Costs a Burden, but Public Trustees Look Hopefully Toward Future

THE year 1923 was the largest in points of gross receipts and passengers carried in the experience of the Boston Elevated Railway. It was the fifth calendar year of public operation. There was a gain of \$679,632 for the year, compared with \$1,412,189 for 1922.

Owing to the increase in labor costs that followed the arbitration award of October, which was retroactive to July 1, 1923, the cost of service during the last six months of the year showed a substantial increase. In fact, the increase in wages made it necessary to call upon the reserve fund to help meet the cost of service. On Jan. 1, 1924, the balance in the reserve fund was \$624,889.

In July, 1923, the trustees turned over to the Commonwealth \$1,114,557 for distribution to the cities and towns which contributed to the loan assessment to meet the deficit of the first year of public operation. There remains a balance of \$2,348,397 still due to the municipalities on this loan.

The average receipts per passenger for the year were 8.923 cents. The allocation of the receipts is shown in one of the accompanying tables.

As far as operating cost and operating revenue are concerned, the public trustees say it may be safely predicted that at the end of the year which will close on June 30, 1924, it should be found that receipts have at least been equal to expenditures so that there should be no deficit to assess on cities and towns served. This result is expected despite the fact that the increase in wages during the past year will add approximately \$2,500,000 to the labor cost for the year ended June 30, 1924, on more than twice the excess of revenue over the cost of service for the preceding year. As the trustees see it, the answer to the question is that unusual freedom from expense in the removal of snow has continued so long as seemingly to assure a small rather than a large expense for the entire season.

Another reason for the faith of the trustees is their belief in the continuance of the increased traffic which has made the past calendar year a record breaking one in the number of passengers carried. This increase marks the practical restoration of traffic lost at first under the 10-cent fare, a restoration due in large part to the introduction of 5-cent fare lines that are now carrying more than one-quarter of the traffic. Another thing, the results are beginning to be shown in a really appreciable way of economies long in preparation. As a specific instance it is pointed out that through the introduction of modern boilers at

South Boston, as well as the introduction of new light-weight cars—notwithstanding an increase of 3,474,577 miles and of 25,555,755 passengers carried—13,409 fewer tons of coal were burned than last year. After all, however, the trustees say it must remain true that whatever compensating factors may be found, the increased cost of labor will inevitably tend to check the development of additional 5-cent fare lines and improvements in service, and will delay the reimbursement of cities and towns.

The trustees are cognizant of the need of extensions of the rapid transit system to meet the demands of heavy traffic, and they refer to specific improvements of intimate interest to

STATEMENT OF TOTAL REVENUE PASSENGERS CARRIED BY THE BOSTON ELEVATED RAILWAY

1923	382,149,697
1922	356,593,942
1921	337,252,080
1920	335,526,561
1919	324,758,685
1918	348,664,700
1917	381,017,338
1916	373,577,908
1915	352,469,586

ALLOCATION OF RECEIPTS PER PASSENGER OF THE BOSTON ELEVATED RAILWAY IN 1923

	Cents
Labor	4.246
Interest on bonds and notes	0.606
Rent of subways and tunnels	0.530
Rent of based roads	0.834
Coal	0.482
Depreciation	0.524
Damages	0.215
Material and other items	0.866
Taxes	0.442
Total	8.745
Excess of receipts over cost of service	0.178
Average receipts per revenue passenger	8.923

REVENUE RIDES PER CAPITA ON BOSTON ELEVATED RAILWAY

1923	320
1918	300
1913	298
1908	277
1903	262

COMPARATIVE DIVISION OF RECEIPTS AND EXPENDITURES OF BOSTON ELEVATED RAILWAY FOR YEAR ENDED DEC. 31.

	1923	1922	1921	1920	1919
Total receipts	\$34,096,813	\$32,699,176	\$33,277,025	\$34,031,636	\$29,498,583
Operating expenses:					
Wages	\$16,224,277	\$14,772,341	\$15,563,255	\$17,216,445	\$15,539,105
Material and supplies	3,236,805	2,903,650	3,093,934	3,310,858	3,640,065
Injuries and damages	822,775	555,355	518,249	640,165	701,907
Depreciation	2,004,000	2,004,000	2,004,000	2,004,000	2,004,000
Fuel	1,842,396	1,853,112	1,663,618	2,597,654	1,815,262
Total operating expenses	\$24,130,253	\$22,088,458	\$22,843,056	\$25,769,122	\$23,700,339
Taxes	1,688,139	1,587,186	1,546,758	1,142,987	1,045,502
Rent of leased roads (including dividend rental under chapter 159, Acts of 1918)	3,185,577	3,646,595	4,203,064	4,102,230	4,002,656
Subway and tunnel rents	2,026,936	2,008,417	1,963,737	1,790,432	1,516,047
Interest on bonds and notes	2,316,029	1,891,315	1,494,258	1,514,963	1,555,790
Miscellaneous items	70,247	65,016	54,707	59,069	60,348
Total cost of service	\$33,417,181	\$31,286,987	\$32,105,580	\$34,378,803	\$31,880,682
Loss for year				\$347,167	\$2,382,099
Gain for year	\$679,632	\$1,412,189	\$1,171,445		
Profit and loss items not included in above					

TRAFFIC STATISTICS OF THE BOSTON ELEVATED RAILWAY FOR YEAR ENDED DEC. 31.

	1923	1922	1921	1920
Round trips operated	6,488,082	6,059,531	5,773,584	5,764,347
Passenger revenue	\$33,297,951.50	\$31,834,022.77	\$32,253,629.59	\$33,108,946.48
Passenger revenue per car-mile (cents)	61.61*	62.94	64.89	64.62
Passenger revenue per car-hour	\$5.71*	\$7.09	\$7.36	\$7.16
Passenger revenue mileage	54,049,665†	50,575,088	49,706,697	51,237,527
Passenger revenue car-hours	5,826,993*	4,487,400	4,381,815	4,627,295
Revenue passengers carried	382,149,697	356,593,942	337,252,080	335,526,561
Revenue passengers carried per car-mile	7.070	7.051	6.785	6.548
Revenue passengers carried per car-hour	65.58*	79.47	76.97	72.51

* Car-hours, American Electric Railway Association Standard, adopted Feb. 1, 1923. † Including motor bus mileage 465,382.

COMPARATIVE POWER STATION STATISTICS OF THE BOSTON ELEVATED RAILWAY

	1923	1922	1921	1920	1919	1918	1917
Tons of coal burned	260,032	273,441	215,870	258,087	287,670	281,677	270,452
Pounds of coal per kilowatt-hour	2.264	2.553	2.174	2.353	2.835	2.772	2.309
Average price of coal per ton	\$7.085	\$6.777	\$7.71	\$10.07	\$5.91	\$6.26	\$4.19
Net cost of power for car service per kilowatt-hour (cents)	1.227	1.414	1.172	1.921	1.307	1.158	.620
Net cost of power per total revenue car-mile (cents)	5.468	6.153	4.815	8.538	5.439	4.668	2.573
Direct current annual output (kilowatts)	257,270,357	239,905,874	222,461,060	245,676,503	239,892,118	227,582,057	262,343,882
Direct current maximum hour output (kilowatts)	82,965	78,755	75,905	72,295	71,760	67,965	79,535

HISTORY OF THE 1919 LOAN ASSESSMENT ON CITIES AND TOWNS (CHAPTER 159, SPECIAL ACTS OF 1918)

Allocation of Assessment on Cities and Towns of Boston Elevated Deficit, Year ended June 30, 1919.

Cities and Towns	Passengers	Per Cent	Amount of Assessment	Distribution of July, 1922, Repayment	Distribution of July, 1923, Repayment	Balance Due
Boston.....	2,100,423	71.9330	\$2,863,042	\$372,034	\$790,029	\$1,700,978
Cambridge.....	283,475	9.7081	386,397	50,209	106,622	229,564
Somerville.....	122,583	4.1981	167,090	21,712	46,106	99,271
Brookline.....	74,553	2.5532	101,621	13,205	28,040	60,375
Medford.....	59,754	2.0464	81,449	10,583	22,475	48,390
Malden.....	55,838	1.9123	76,112	9,890	21,002	45,219
Everett.....	54,823	1.8775	74,727	9,710	20,619	44,397
Watertown.....	41,198	1.4109	56,155	7,297	15,496	33,367
Arlington.....	32,477	1.1122	44,267	5,752	12,215	26,299
Chelsea.....	29,659	1.0157	40,426	5,253	11,154	24,018
Newton.....	27,201	.9316	37,079	4,818	10,231	22,029
Belmont.....	18,746	.6420	25,552	3,320	7,058	15,180
Quincy (Commonwealth of Massachusetts).....	15,569	.5332	21,227	2,757	18,464	.....
Stonham (Commonwealth of Massachusetts).....	3,674	.1258	5,007	656	4,356	.....
Commonwealth of Massachusetts*.....	.....	.....	.....	.....	690	†690
Totals.....	2,919,973	100.00	\$3,980,151	\$517,196	\$1,114,557	\$2,348,397

Based on traffic counts made July 24, 25, 26, 27, 1919, in accordance with the provisions of section 14, chapter 159, Special Acts of 1918.

* From the July, 1923, repayment the Commonwealth of Massachusetts deducted \$690.24 to reimburse themselves for the difference between 126 days' interest at 4.28 per cent on \$4,000,000 (note issued July 17, 1919, due November 20, 1919) and \$3,980,151.67, the amount paid to the Boston Elevated Railway Company. \$297

And interest from July 17, 1919, to July 19, 1923, on amount the State deducted to pay assessment of Quincy and Stonham. 393

Amount of expense to State to be assessed to towns and cities pro rata to their original contribution. \$690

† Credit.

Boston that should be carried out. In this connection they look forward hopefully to the report of the Metropolitan Planning Board and to the adoption of a comprehensive plan for the orderly and consistent development of separate trunk lines to provide a harmonious and well devised system of transportation for Boston and suburban cities and towns. The trustees see money at hand as needed at lowest prices for subways, tunnels and permanent structures through municipal investment, to be repaid in rentals by the operating lessee, but immediately in the foreground they see the outstanding need for capital for the purchase of additional cars, for enlarged power and shop facilities, and other equipment. To carry out these last-mentioned improvements additional capital can only be procured by the sale of securities of the Boston Elevated Railway, either in the form of stocks or bonds. At the time of the passage of the public control act in 1918 it was believed that the dividend rate of 6 per cent assured it would be possible to issue new stock and obtain new capital in that way, but such has not been the case. On this point the trustees say:

Quite likely this is due in part to the indefiniteness of the period of public control which under Chapter 159 of the special acts of 1918 continues until 1928, and thereafter until terminated by act of the Legislature. The investor does not know what action the Legislature may take, and consequently this stock does not hold the position which certainty of return would produce. This element of doubt also adversely affects the marketing of long-term bonds.

Astoria System Offered for Sale

The electric railway system of the Pacific Power & Light Company, operating in Astoria, Ore., has been offered to the city, the port commission or any interested party who will operate it, for the salvage price of \$70,000. The valuation placed on the system by the State Tax Commission was \$262,000.

The company has notified the city that it would suspend operations on

March 1 and Guy W. Talbot, president, advised the city officials at a recent conference that it was impossible for the company to change its plans. He states that the railway has lost money for several years, and that an investment of \$110,000 would be necessary to restore the system through the area burned in the big fire that practically destroyed the city a year ago.

Mr. Talbot stated that as a result of the inroads in the railway business by buses and privately owned cars the line was wholly incapable of operating at a profit. He said that in 1923 the net loss was \$42,718. The loss in 1922 was \$33,500; in 1921, \$36,500; in 1920, \$17,000 and in 1919, \$23,000.

At the same time the City Manager of Astoria recommended that the city advertise for bids for a franchise to operate an intracity bus system. The commission has since voted unanimously to empower the manager to secure such bids.

Merger in New Jersey a Possibility

A merger bill has been introduced in the Legislature of New Jersey, designed to facilitate future financing of utility development. The bill is in the interest of the Public Service Corporation of New Jersey, but it has been explained that it is quite possible the merger enabling act may never be made use of by the Public Service. In view of the facts, however, that the time for introducing bills without unanimous consent was expiring, and that the Legislature would shortly adjourn for another year, it was deemed wise to have the merger bill introduced so that, if passed, necessary legal machinery required for this particular plan would be available. Other plans under consideration require no change in existing law.

On behalf of the company it has been explained that the Public Service group has reached a point in its continuing development which makes its

financial requirements approximately \$20,000,000 a year. The outlook is that the demand for increasing utility services, to keep pace with population and industrial growth, will make similar requirements an annual necessity for some time to come. A number of plans designed to meet this financial prospect have been discussed, but none of these possible plans has yet been completed in detail, and the merger plan is merely one of those under consideration, because of its ability to provide a broader supporting basis for future financing.

Interest Defaulted by Michigan Interurban

The Grand Rapids, Holland & Chicago Railway, Holland, Mich., operating between Grand Rapids, Holland and Macatawa Park, defaulted in the payment of interest on its bonds due on Feb. 1 and a committee headed by Steward Hanley, Detroit, as chairman, has been appointed to protect the interests of the bondholders.

There are \$1,475,000 of first mortgage twenty-year bonds outstanding. They were extended at 7 per cent to Aug. 1, 1924.

It is explained that the position of the company was affected among other things by the decision of the Michigan Supreme Court, dated Dec. 19, 1923, requiring the company to pave between its tracks running through the village of Grandville, involving the expenditure of approximately \$70,000 by May 1, 1924, or forfeit its franchise.

Separation of Railway and Light Properties Approved

The meeting of stockholders of the Commonwealth Power Corporation has been held, the organization of the Electric Railway Securities Company has been effected and the transfer of the assets of the Commonwealth Power, Railway & Light Company has been made. The last-mentioned company is now prepared to distribute to holders of its common stock one share of Commonwealth Power Corporation common stock and one-half share of Electric Railway Securities Company capital stock for each share of common stock of Commonwealth Power, Railway & Light Company surrendered for cancellation.

As explained previously in the ELECTRIC RAILWAY JOURNAL the plan contemplates the segregation of the former railway and the electric light and power properties of the Commonwealth Power, Railway & Light Company.

The Electric Railway Securities Company either directly or through the Union Railway, Gas & Electric Company, by ownership of stock of the companies, will control the Grand Rapids Railway, the Michigan Electric Railway, the Michigan Railroad, the Grand Rapids, Holland & Chicago Railway, the Saginaw Transit Company, the Rockford & Interurban Railway and the Janesville Traction Company. These companies have outstanding stocks and bonds to the amount of \$52,361,596, of which \$24,422,603 are owned

by the Electric Railway Securities Company.

An initial dividend of \$1 a share has been declared on the common stock of the Commonwealth Power Corporation for the quarter ending April 30, 1924.

Detroit Commission Will Revise Purchase Contract

The City Street Railway Commission of Detroit is working upon a plan of revising the purchase contract covering the lines now included in the municipal railway, so that the period of payment can be spread over a longer period of time, thereby making available more of the earnings of the Detroit Street Railways for improvements of all kinds.

Ross Schram, assistant general manager, calls attention to the large amount that must be set aside as charges necessary to repay the original \$15,000,000 bond issue and take care of the purchase of the D. U. R. system over a ten-year period. Approximately 9 cents from every car-mile operated is required to meet these fixed charges, he stated. The actual cost of operating a car-mile is approximately 32 cents. Adding to this 9 cents for fixed charges makes it necessary for each car operating one mile over the system to earn a fraction more than 41 cents, while the average earnings per car-mile is 43.7 cents.

It is further pointed out that the system is operating upon the second lowest fare in any large city in the United States, while it is paying the second highest rate of wages to its platform employees.

State Body Asked to Approve Brooklyn Stock Increase

The Brooklyn City Railroad has applied to the New York Transit Commission for approval of the issuance of \$4,000,000 in additional capital stock of the company, to cover the purchases of rolling stock made on its behalf by the Brooklyn City Development Corporation.

In its petition the railway states that it made expenditures from earnings in excess of \$4,900,000 consisting of \$500,000 on track and roadway, \$150,000 for converting and improving the cars and \$4,260,000 in the purchase of the capital stock of the Brooklyn City Development Corporation. The latter corporation has used the sum so realized, the petition states, in the purchase of additional cars.

The petition further says that in connection with the addition of the new capital stock to the existing securities of the Brooklyn City Railroad, it will dissolve the Brooklyn City Development Corporation and have transferred to it the rolling stock purchased by that company. The new shares will be divided pro rata among the shareholders of the Brooklyn City Railroad if the issue of the \$4,000,000 requested is approved by the commission.

The commission has fixed Feb. 18 as the date for a hearing upon the petition.

As announced previously in the *ELECTRIC RAILWAY JOURNAL*, the stockholders have already approved the proposal to issue the additional stock.

Amendment to End Tax-Exempt Issues Fails

The constitutional amendment designed to stop the issuance of tax-exempt securities failed in the House on Feb. 8 because it lacked seven votes of the necessary two-thirds.

Passage of the amendment was asked by President Coolidge and Secretary Mellon. Most of the votes against it came from the Democratic side of the House, but eighteen Republicans voted "no," while sixty-nine Democrats voted in the affirmative. The chief argument of the opposition was that state rights would be invaded.

\$1,250,000 to Montreal Tramway for Terminal Section

Sale of the Montreal Terminal Section of the Montreal Tramways system is authorized in a bill which passed the private bills committee of the Legislative Assembly on Jan. 31. The company cannot sell any portion of its system without an amendment to the contract between the company and the city. It was explained that there was no intention of depriving the district at present served by the line of service, and that the new line necessary would be built before the sale was effected and the line turned over.

The tramway will receive \$1,250,000 for the line from the Canadian National Railways, which needs another outlet to the eastern end of the Island of Montreal. The money which the tramway will receive for the line will either go to building the new track needed, or, if not needed for capital expenditures, will go into one of the various funds.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were no sales of electric railway securities this week.

Wants to Abandon.—The Pennsylvania & Ohio Traction Company of Ashtabula recently petitioned the State Public Utilities Commission for authority to abandon its service connecting Conneaut, Ashtabula and Jefferson, Ohio.

Officers Elected for Successor Road.—The first meeting of the new Gardner-Templeton Street Railway was held on Feb. 5. Officers were elected as follows: Charles Mulhodo, president; Edgar A. Shepardson, vice-president, and Ralph Kelly, secretary and treasurer. Louis Starkey has been named superintendent of the line. The company took over control of the line on Feb. 7.

Conditional Suspension Authorized.—The San Diego Electric Railway has been authorized to suspend service and to abandon and remove its tracks and appurtenances on the so-called Old Town line in San Diego, Cal., conditional upon the establishment of regular bus service. The company is also authorized to suspend service and to remove the tracks on the so-called Ocean Beach line between the intersection of Rosecrans and MacAulay Streets and the intersection of Voltaire and Bacon

Streets, conditional upon regular operation of the new high-speed railway service and regular operation of a bus service.

Will Pay Tax.—The Denver Tramway, Denver, Col., is ready to pay to the city of Denver the \$205,000 awarded the city by the decision of the United States Court of Appeals, St. Louis. The amount is the accumulation of the \$5,000 a month franchise tax the tramway agreed to pay the city, and did pay up to the time the company went into the hands of a receiver.

Bus Supplants Railway.—Unless the city of Greeley, Col., grows very much larger it is doubtful whether there will be any more tramway service provided for its residents. The line which did operate there, known as the Greeley & Denver Railroad, suspended service some time ago because it was unable to meet expenses. When it was found that the tramway could no longer continue, F. E. James, a local automobile dealer, started a bus line with twenty vehicles. The railway did likewise, and for some months both the James Company and the railway gave bus service, but the railway finally withdrew its vehicles. The tracks, trolley and all the equipment formerly used by the Greeley & Denver Railroad has been sold as junk to M. S. Radetzky, Denver.

Board of Trustees Appointed.—The Selectment of Athol, Mass., have appointed a board of five trustees to manage the Athol & Orange Street Railway, which is to be put under town management in about a month.

\$548,020 Taken to Meet Board Payments.—The operating fund of the Seattle Municipal Railway was recently invaded to the extent of \$548,020, to help meet the railway's bonds and interest payments, due on March 1. This leaves a deficit of \$80,000 in the operating fund, which will be shortly replenished by daily earnings. Payment on the principal on March 1 is \$833,000. The interest payment due then is \$363,100. This makes the total payment \$1,196,100.

Denies Company Is Negotiating for Tulsa Lines.—J. A. Frates, vice-president of the Oklahoma Union Railway, Tulsa, has advised the press that reports to the effect that his company is negotiating for the purchase of the lines of the Tulsa Street Railway are in error. Rumors in Tulsa and elsewhere have had it that the Oklahoma Union was a bidder for the Tulsa property.

Receiver Appointed.—J. H. Bridgers has been named receiver of the Alamance Railway, Burlington, N. C. The line connects Burlington, Graham and Haw River. It has been operating 8 miles of line.

Seeks to Abandon.—The Pacific Electric Railway has applied to the California Railroad Commission for permission to abandon service on its Laurel Canyon line in Sunset Boulevard, Hollywood, from Gardner Junction to the end of the line. The Los Angeles Motor Bus Company, which is controlled by the Pacific Electric Railway and the Los Angeles Railway, has placed in operation on that route service with ten-minute headway.

Traffic and Transportation

Last Fare Hearing in Atlanta

The fifth and for a time the last public hearing of the Georgia Railway & Power Company on its petition for increased fares and the elimination of jitneys was held on Feb. 6.

Sam Schlesinger, head of the Atlanta Jitney Bus Association, had figures to show that the jitney operators were paying into the city treasury in taxes an amount equal to more than 3 per cent of their gross income. Seven-cent fares for jitney buses instead of the present 10 cents, with a possible reduction in fare to 5 cents later on, were promised by Mr. Schlesinger on behalf of the jitney association. Mr. Schlesinger also commented upon the new line of Brown buses, which started recently to operate from the Brookwood Station on Peachtree Street to the central portion of the city.

Eugene C. Calloway, prominent Atlanta business man, spoke in favor of the fare increase, pointing out that if the railway was unable to extend its lines so as to serve the suburbs of the city, this would result in higher rents and greater congestion in the downtown area of the city, a condition every one was trying to avoid.

Indications are that this will be the last public hearing held on the proposed rate increase for from ten days to a week, when the report of the City Council's auditing committee will come up for discussion. If the report of the auditing committee shows the financial condition of the company to be substantially as stated in the petition, it will settle matters for the Georgia Railway & Power Company in the public mind. The company is asking for an increase in fare from 7 to 10 cents, for the privilege of asking 2 cents for transfers, and for the elimination of jitneys from the streets on which its lines are operated. Unless these things can be secured, the company has warned the public that it cannot make any extensions or improvements in its service, and may be forced to cease operation.

John A. Beeler, consulting engineer, New York, has been employed by the city of Atlanta, Ga., to make a general traffic study looking toward relief of congestion and more effective operation of the street cars. He is employed by the city and will report to the city, but the Georgia Railway & Power Company has agreed to pay for the work.

Five-Cent Fare in Washington Declared Ruinous

The Public Utilities Commission of the District of Columbia recently struck several body blows at the proposal for a 5-cent fare in the District in a letter dispatched to Senator L. Heisler Ball, chairman of the Senate District committee. The high light of the letter is a statement of figures showing that the two railways of the District would have lost a total of more than \$1,000,000, even if they did not have to pay taxes,

had a 5-cent fare been in effect during the past year.

The letter was written by the District Commissioners as a report on the Senate bill which would prohibit the Public Utilities Commission from fixing rates of fare for railways in excess of those stipulated in their charters. Since the 5-cent fare is stipulated in the charters, the bill would by such wording make the 5-cent fare the maximum in the District.

The letter declared that the effect of a cash fare of 5 cents with tickets at the rate of six for 25 cents, as provided by the terms of this bill, would be ruinous to the railways, and disastrous to the efficient service now furnished the public by those local corporations.

Arrangements Made for Bus Service in British Columbia

De luxe motor bus service will be given between Vancouver and New Westminster, 12½ miles distant, by a company to be formed by the British Columbia Electric Railway and which will be known as the British Columbia Rapid Transit Company. The new company will have a capital of \$500,000.

There is at present an interurban line operated by the railway between the two cities, on which a twenty-minute service with multiple-unit trains is given. For many years jitney service has been competing on the highway paralleling the interurban line.

The British Columbia Electric Railway has now decided to operate de luxe buses between its own terminals, probably on a twenty-minute headway, in competition with its own railway. Details as to number of buses, fares to be charged, etc., have not yet been arranged. At present the railway fare is 35 cents return, whereas the jitney fare is 70 cents return.

Rerouting in Davenport Proves Effective

Tri-City Railway Gives Better Service Following Track Abandonment and Construction—
Ten-Cent Fare in Effect

A COMPREHENSIVE rerouting of electric railway lines in Davenport as a means of meeting present-day conditions, lowering the cost of operation, eliminating parallel trackage, providing for future expansion, cutting out loops and giving better service has been put into operation by the Tri-City Railway of Iowa and is proving its practical efficiency despite the severe handicaps of heavy snows and cold which accompanied the change.

The total cost of the rerouting is \$102,000, of which \$77,000 is for new tracks and passing tracks and \$25,000 for track abandonment. The plan was approved by the City Council after months of negotiations and was accompanied by a change in fares. Instead of the old 8-cent flat fare a new cash fare of 10 cents was put into effect, with the provision of sale of tickets at the rate of three for a quarter and fifteen for a dollar. The sale of the tickets at the rate of fifteen for \$1 has been heavy since the rerouting went into effect and the average of fares has not been quite as high as the city had estimated. The fare arrangement is a tentative one and according to an ordinance provision may be changed this summer if it is found that the revenues of the company do not provide a sufficient return on the investment.

One of the features of the new system of operation is more frequent service during the peak hours. When the old schedule provided for a fifteen-minute service throughout the day and early evening, the new schedule betters this service considerably by furnishing a ten-minute schedule during the rush hours. On main trunk lines through the business district ten-minute schedules have been raised to seven and one-half-minute intervals and seven and one-half to five-minute intervals during the rush periods.

The Davenport system had originally been built up by competing companies and had never been completely revised. Some changes for the better had been made, but before the recent changes were put into effect the company had never been able to convince the conflicting interests, business and residential, that a comprehensive revision of lines and schedules should take place. Individual lines furnished a fifteen-minute interval of service throughout the day, with some trippers during peak hours. Service on separate lines could not be co-ordinated on the main line tracks and this caused "fleeting" of cars during certain periods. The company was confronted yearly with city paving programs which required large expenditures for track paving. This great expense made it necessary to work out a system which would retain only the track necessary to give ample transportation needs for the present and to provide for future expansion.

In working out a comprehensive rerouting plan the officials of the Tri-City Railway sought to:

1. Cut out all loops at end of lines to provide for future extensions and economize in operations.
2. Pair lines which provide the maximum of through trips without transfer.
3. Route lines to operate through the business district instead of looping.
4. Retain lines which will provide service, with maximum walking distance of three blocks in so far as topographical conditions and present property will permit.
5. Establish main trunk lines for business district operating two or more lines over the same track, branching out into the residential districts at the ends.
6. Regulate the length of branch lines so that an equal interval of service can be maintained on trunk lines.
7. Vary the interval of service on lines to meet the demand.

To carry out these principles extensive track changes were necessary and these included track abandonment, construction of new single track and construction of new passing tracks. Four

miles of track, duplicating lines and overextended lines were abandoned. One-half mile of new single track was constructed to connect sections of old lines and eight passing tracks were installed.

The completion of the project is marked by public good will, due largely to the method in which the negotiations with the city were conducted. The project was announced in a series of newspaper advertisements in which all angles of the proposition were explained. It was also discussed by various civic bodies, and the City Council and traction company received the benefit of suggestions from the public through these civic organizations.

Company Paper Fulfilling Its Mission

Baltimore Trolley Topics, published by the United Railways & Electric Company, with the January issue entered upon its eighth year. The management is enthusiastic over the extent to which this little paper has fulfilled its mission, which is accounted for largely by the high tone the publication has preserved consistently. While each issue of the publication is quite naturally given over to current news, the file of the paper does afford a good news if not technical record of the history of the principal doings of the company.

Additional Time for Improvements at Schenectady

There was a hearing on Feb. 7 before Public Service Commissioner Van Voorhis upon the petition of the Schenectady Railway for an extension of time in which it is to comply with the terms of an order issued by the commission last September directing the railway to make certain improvements and additions to give better service.

It was stated on behalf of the railway that orders had been placed for ten new modern city cars and that it has been promised the cars would be delivered some time between March 15 and March 30. The company asked that the terms of the order last September be extended until June 1. President E. M. Walker said the service is now apparently satisfactory and that instead of receiving letters of complaint the company is in receipt of commendatory communications.

It was further stated that a company would at once apply to the Common Council for franchises for authority to operate two bus lines to serve as feeders to the Schenectady Railway with transfer privileges between the trolley and the bus lines. The lines are to be known as the Bellview and Mount Pleasant lines. In this connection the Schenectady Railway Bus Line, Inc., has been incorporated for a period of fifty years with a capital of \$30,000.

The hearing was closed with the understanding that prior to June 1 the company will submit a detailed report of the improvements ordered by the commission.

The ultimate effect of the understanding arrived at will probably be to stay

the proceedings now pending in the Supreme Court to penalize the railway for failure to comply with the commission's order. This proceeding antedated Mr. Walker's assumption of the presidency of the company.

New Trains and Faster Runs on Illinois Traction System

Four fast trains have been added to the daily schedule of the Illinois Traction System between Springfield and Danville. This is the outstanding feature of the general change in schedule which went into effect on Jan. 13.

Where the previous running time between Springfield and Danville of the regular limited trains was five hours and five minutes, the four new trains will each make the run in four hours and fifteen minutes, cutting fifty minutes from the running time on the 120 miles between terminals. The trains leave each terminal at 9 a.m. and 1 p.m.

Four fast trains daily have also been introduced on the Peoria-Bloomington-Decatur Division.

The 9 and 11 p.m. trains out of Springfield, Champaign, Danville and Decatur have been consolidated into one train, leaving each of these points at 10 p.m. Where consolidation of evening trains has taken effect, it is due to paralleling hard roads and the resulting increase of automobile travel, which during the past years has made increasingly heavy inroads on the passenger business of railroads in general. Traction operating officials have endeavored to consolidate the late evening trains with a minimum of inconvenience to the railway passenger.

Other changes between Danville and Springfield are of minor nature and consist mostly in shortening the running time where possible.

Wants Jitneys Under Commission Control.—Clinton Q. Richmond, president of the Berkshire Street Railway, Pittsfield, Mass., has petitioned the Massachusetts Legislature for an act to place all "jitney" buses under the control of the State Department of Public Utilities, in pursuance of a recommendation made by that department in a recent report to the Legislature.

Increase in Fare Allowed.—An increase of fare has been granted the Texas Electric Railway by the City Commissioner at Sherman, effective on Feb. 15. The former fare was 5 cents. The new fare is 7 cents with four tokens for 25 cents.

Railway and Bus Co-operate.—C. W. Richards, general passenger agent of the Denver & Interurban Railroad, Denver, Col., who has just returned from Chicago, says that plans have been arranged which will permit through passengers a ten days stop over in Denver. Denver & Interurban has completed arrangements with the Glacier Automobile Company whereby a ticket can be purchased at Denver, the various coupons attached being honored by the Glacier people for vari-

ous trips "on the side," these trips to be made via bus or automobile. During the summer season the Denver & Interurban will run daily cars from Denver to Eldorado Springs.

Overhead Registers in Use.—The use of tokens and also of hand registers has been abolished on cars of the Northern Massachusetts Street Railway running east of Athol fair grounds to South Gardner, Baldwinville and Templeton, effective Feb. 4. Overhead registers have been installed.

Eight Cents Allowed.—The Ogdensburg Street Railway, Ogdensburg, N. Y., now operated by a receiver, has been given permission by the Public Service Commission to charge an 8-cent cash fare in Ogdensburg, in place of a 7-cent fare. The company is further permitted to sell five tickets for 35 cents and to charge school children during certain hours on school days a fare of 5 cents. It was shown at the hearing before the commission that the revenue per car-mile was less than on any other system in the state, except on a line near Buffalo, also in the hands of a receiver, and on a line on Long Island which recently suspended operations. The evidence submitted showed that based on actual operations for nine months and three months estimated the company in 1923, after paying its operating expenses and taxes, had a balance of \$2,984, or a return of less than 1½ per cent on the value of its property.

Bus Bills Introduced.—Two bills were introduced in the New York Legislature on Jan. 30 to permit cities to own, operate or lease bus lines. Under a measure sponsored by Assemblyman McCarthy, New York City would be authorized to establish bus lines with a fare not to exceed 5 cents, under the management of the Commissioner of Plant and Structures. Senator Lacey proposes adding a new section to the transportation corporations law permitting cities to own or operate bus lines without obtaining a certificate of convenience and necessity from the Public Service Commission.

Will Extend Bus Service.—The Connecticut Company will extend the Brooklawn-Ash Creek bus service in Bridgeport during hours of heavy travel. The extension will cover Tunxis Hill Road to Knapps Corner.

Buses in Operation.—Three new buses purchased by the Birmingham Railway, Light & Power Company as permanent equipment are now in service in Birmingham. The last of the three was put in service on Feb. 7 on Milner Heights and the other two went into service several days ago on Avenue F. All three buses are operating as extensions of car lines in territory which formerly had bus or jitney service which was discontinued under the settlement ordinance adopted by the city, by which jitneys were banned. A fourth bus is held in reserve for emergency. Transfers are given from the buses to the cars and from cars to the buses. The regular 2-cent transfer charge is made. The four new buses take the place of three which were leased for temporary operation some time ago.

Fare Increase Wanted in Petersburg.—Officials of the Virginia Railway & Power Company have addressed the City Council at Petersburg, Va., stating that the company plans to apply to the State Corporation Commission for an increase in fare in Petersburg. The Petersburg City Council has been asked to recommend a change from 5 cents to 6 cents cash, with five tickets for 25 cents, on the ground that the members of this Council are familiar with the needs of the property.

Will Run Free Buses.—In a movement for a reduction of interurban fares to Culver City and Palms, Cal., the commuters of those two centers have decided to operate two free buses and 200 motorists have agreed to take machine loads of passengers to and from work. For some time an effort has been made to persuade the Pacific Electric Railway, Los Angeles, Cal., to lower rates. When this was unsuccessful, the free-bus plan was decided upon. At a recent meeting attended by civic leaders, the sum of \$3,000 was pledged to pay for the buses. Another \$5,000 has since been contributed. As no fare is to be charged, the buses can be operated without a franchise from the State Railroad Commission.

One-Man Cars on New York Interurban.—One-man cars have been installed on the interurban line of the United Traction Company between Albany and Cohoes. There are two 7-cent zones on this line and they overlap each other to take care of the local traffic out of the two cities. The passenger riding beyond the limits of the one-fare zone on entering the car receives a colored slip, which is surrendered on his exit. Those passengers riding within the zone receive no slip.

Will Start Another Bus Line.—The Boston Elevated Railway will establish a bus line between Everett Square, Dorchester, Mass., and Head House, City Point, South Boston. General Manager Dana has been authorized to make the final arrangements by the trustees of the company for the bus line, which the company plans to operate from May 30 to Oct. 12.

Reduction Approved.—The Public Service Commission has approved the reduction in book rates from \$5.50 to \$5 on the Rochester, Lockport & Buffalo Railroad line between Burrows Street, Rochester, and Lockport terminal. The book contains 200 miles of transportation. The reduction became effective Feb. 1, 1924.

Fare Increased.—The Philadelphia & West Chester Traction Company, Upper Darby, Pa., has announced an increase in fare, beginning Feb. 27, when the zone fare will be 7 cents instead of 6 cents, with four strip tickets for a quarter. Increased cost of maintenance, in view of recent extensive improvements, is given as the reason for the increase. The lines affected are those to West Chester, Ardmore, Media and Sharon Hill.

Six-Cent Fare Not Sufficient.—J. E. Zimmerman, president of the Penn Central Light & Power Company in a recent address before the Lewistown, Pa., Chamber of Commerce said that the Lewistown & Reedsville Electric Railway earned only 3 per cent on its

investment during 1923, and that it was necessary to increase the fares from 6 cents to 7 cents. He showed that during the period from 1918 to 1923 inclusive the increase in income of the company, operating between those towns, was only \$22,000, or less than \$4,000 a year, while the increased expenses of operation was \$60,000, or \$12,000 annually. The gross revenue of the company averaged \$150,000 a year. A 7-cent fare would provide \$24,000 additional revenue annually.

First Bus to Be Operated.—The Fitchburg & Leominster Street Railway, Fitchburg, Mass., has received its first new bus. It will be used to make the trip from Fitchburg center to the Burbank Hospital.

Passenger Identification Checks.—In the new front entrance, center exit surface cars on the lines of the Brooklyn City Railroad the passenger pays as he passes the conductor, who is stationed in the well at the center. In order to facilitate passenger movement and add to the convenience of the passenger conductors have been supplied with identification checks which are handed by the conductor to passengers who have passed him and stand in the rear of the car and then discover seats vacant in the front end among the passengers who have not yet paid their fares. When the passenger who holds the identification check leaves the car he returns the check to the conductor.

Straight Ten-Cent Fare Asked.—The Fitchburg & Leominster Street Railway, which connects Fitchburg and Leominster, Shirley, Lunenburg and Ayer, has filed a request with the State Department of Public Utilities for a tariff canceling sale of tickets, allowing 8½ cents per ticket, and establishing a straight 10-cent fare.

Buses Will Serve on Carless Routes.—Plans have been completed by the Houston Electric Company to place six twenty-nine-passenger buses in service in Houston, Tex., on April 1 on a route that is not served by street cars but which has been served for a long time by private jitney lines. The date set is the time for all jitneys to cease business in Houston under the terms of an ordinance instituted by the voters of the city at a recent election. The new line will traverse Austin, Holman, Crawford and McGowen Streets.

Bus Line as Feeder Started.—The Eastern Texas Electric Company, Beaumont, Tex., has started a bus line from Port Neches to Netherlands, as a feeder for its interurban line now operated from Beaumont to Port Arthur. Buses seating twenty-five passengers are in service on regular schedule to meet cars of the Beaumont-Port Arthur service.

Plans Bus Line.—The Portland Railway, Light & Power Company, Portland, Ore., plans the establishment of a bus line over the Ross Island bridge to accommodate a territory not now served by the railway. President Franklin T. Griffith has asked City Commissioner Mann, in charge of public utilities, for a conference on the

subject. Commissioner Mann stated that as long as the company complied with the provisions of the motor bus law no objection would be had by the city to the operation of the line. The City Council will permit no street car lines to pass over the new Ross Island bridge.

Transfer System Simplified.—One of the first steps under the new management to simplify the transfer system of the Pittsburgh Railways, Pittsburgh, Pa., was the announcement that restrictions limiting the issuance and acceptance of crosstown transfers to the city line would be lifted. Under the new regulations, the transfer to a crosstown car will be issued on a fare paid within the first fare zone and upon transfers received from shuttle lines within the first fare zones. Transfers received from the crosstown route are to be given to the limits of the first fare zone and for transfers to shuttle lines within the first zone.

Orders Change in Fare.—The California Railroad Commission recently decided that the fare and commutation charges of the San Francisco-Oakland Terminal Railways between San Francisco and Piedmont were unjust and unduly discriminatory. The commission has therefore ordered the railway to submit for its approval a tariff for passenger fares, removing the discrimination. The city of Piedmont had filed a complaint against the railway alleging that the one-way and commutation fares between San Francisco and Piedmont were higher than the fares between San Francisco and Berkeley.

Referendum to Decide Fare.—The City Council of St. Catharines, Ont., has decided to submit to the taxpayers of the city the application of the Canadian National Railways to raise its local fares from 5 to 7 cents. The date of the referendum has not been fixed. The Canadian National also has petitioned the City Council for exemption from local taxation and relief from paving between its tracks in St. Catharines. It also has asked for permission to increase its fare from 5 cents to 8 cents on its line to Port Dalhousie from St. Catharines. The Port Dalhousie Council opposed the proposed increase.

Book Review

Alternating-Current Armature Winding

By Terrell Croft, consulting engineer. McGraw-Hill Book Company, Inc., New York, 1924. 352 pages, illustrated.

This is a practical book on the principles and methods of winding and rewinding alternating-current motors. It is written for the practical man, and there is no mathematical treatment of armature winding save a few examples that have been worked out for specific cases. The book is well illustrated, and the latter half is given over completely to induction motor connection diagrams. This book should be of value to the electric railway shop man who has occasion to rewind alternating-current motors.

Personal Items

C. D. Smith Made General Manager

Former Superintendent of Transportation at New Brighton Appointed to Succeed W. H. Boyce

Clinton D. Smith has been appointed general manager of the Beaver Valley Traction Company and the Pittsburgh & Beaver Street Railway with headquarters at New Brighton, Pa. He succeeds W. H. Boyce, who became commercial manager of the Pittsburgh Railways on Feb. 1.

Anticipating that Mr. Boyce would leave the Beaver Valley when the Pittsburgh Railways were discharged from



C. D. Smith

receivership, Mr. Smith accepted the position of superintendent of transportation at New Brighton eight months ago and has had the advantage of that advance experience on the property. Before going to the Beaver Valley, Mr. Smith was general superintendent of the Pennsylvania-Ohio Electric Company, Youngstown, Ohio.

One of the younger men in the railway industry, his advancement has been rapid. Completing a special engineering course, he became traffic investigator for the Public Service Railway of New Jersey. He remained with the Public Service until 1916, when he accepted a position as superintendent of traffic and schedules with the Pennsylvania-Ohio Electric Company, Youngstown, and was later promoted to superintendent of transportation, then to general superintendent.

The selection and appointment of Mr. Smith as general manager of the Beaver Valley Traction lines was made by E. E. Hamilton, vice-president in charge.

Mr. Smith was born in Harrison, N. J., on June 27, 1888. He was educated in the public schools and matriculated at the Worcester Polytechnic Institute, Worcester, Mass., graduating in the department of electrical engineering in 1912. Immediately after grad-

uation he entered the railway engineering course of the Public Service Railway and pursued the study of operation until 1916.

Mr. Smith is a member of the committee of the American Electric Railway Transportation & Traffic Association on the merchandising of transportation and is a strong advocate of the need for railways to give a complete service upon a basis of selling the rides furnished and having the convenience, surroundings and equipment of a standard to justify their sale and purchase.

As general superintendent of the Pennsylvania-Ohio Electric Company he was one of the first in the industry to recognize the possibilities of the motor coach for providing service in districts where the expenditure of constructing and maintaining electric lines would not be justified. Largely as a result of his advocacy of the use of the bus many communities in Youngstown and adjacent thereto have frequent motor coach service which gives to the residents access to all parts of the city and surrounding territory through transfer to the electric lines.

Mr. Viergever and Mr. Degener Advanced with Michigan Properties

At a meeting of the directors of the Michigan Electric Railway, Michigan Railroad, Grand Rapids, Holland & Chicago Railway and the Lansing Southern Railroad on Feb. 4, Niel M. Viergever was elected secretary of the companies, as well as a director of all except the Michigan Electric Railway, and O. H. Degener, who has been acting in the capacity of assistant treasurer, was elected treasurer of the companies. J. W. Glendening, former secretary and treasurer, resigned to accept a position in the East, announcement of which will be made later.

Mr. Viergever has been with the Grand Rapids Railway for the past eighteen years.

Mr. Degener has been with the Michigan Electric Railway, successor of the Michigan United Railways, in various capacities, for the past seventeen years, having entered the employ of the Michigan United Railways in 1907, filling various positions until he was elected to his present one.

Mr. Glendening went to Jackson with Mr. Collins, as his assistant and as treasurer of the companies under his management, at the time Mr. Collins became vice-president and general manager of the Michigan United Railways and the Michigan Railway in 1912. In 1919 he was elected secretary of the company and for the past year and a half has held the position as secretary and treasurer. Previous to that time, from 1907 to 1912, he was with the companies operating the railway, electric and gas properties in Saginaw and Bay City.

T. T. Parker Made Vice-President

An innate love for things electrical in his youth in a small Illinois town, growing through high school days in Kansas and finally landing him near the top as vice-president and general manager of the Dubuque Electric Company has been the career of T. T. Parker. Until recently he has been general manager of the company.

Mr. Parker's first real electrical work was a four-year course at the Kansas State Agricultural College at Manhattan, in 1907. Then he set poles, strung wires, sold power and did a multitude of other things.

He was with the Kansas Electric Utilities Company at Parsons for two years as a power salesman and commercial manager. Then he went to the Union City (Ind.) Electric Company as manager. He was there for a three-year period. His first appointment as general manager was at Emporia, Kan., with the Kansas Electric Power Company. He was in charge of the Em-



T. T. Parker

poria division, embracing five counties. By his activity there a non-paying railway line was made productive through discontinuance of cars and the substitution of buses.

Walter S. Wyman has been made president of the Central Maine Power Company, Rockland, Me. In 1899 Mr. Wyman was elected general manager of the Waterville & Fairfield Railway & Light Company with offices at Waterville, Me. He held this position until June, 1901. Mr. Wyman's connections have been almost entirely in the lighting and power fields.

John Carl, storekeeper at the Chestnut Street shops of the Indiana Service Corporation, Fort Wayne, Ind., for the last eight years, has been assigned to special work at the Spy Run power station in connection with the installation of new equipment. Erwin Firestone, who has been assistant storekeeper, has succeeded Mr. Carl as storekeeper.

Ernest Barker, formerly master mechanic of the Charleston Consolidated Railway & Lighting Company, Charleston, S. C., resigned Feb. 1 to accept the position of general foreman with the Georgia Railway & Power Company at Atlanta. Previous to Mr. Barker's connection with the Charleston property

he served five years in charge of equipment for the Public Service Railway at Edgewater, N. J. Mr. Barker has had extensive experience with the Interborough Rapid Transit Company and general electrical experience in many branches. His early education was received in the schools of England, where he was born.

H. C. Donecker has resigned from the Public Service Railway, Newark, N. J. He had lately been assistant to Vice-President E. W. Wakelee. Before that he was assistant general manager of the company. Mr. Donecker went to the Public Service Railway in 1913 from the post of secretary of the American Electric Railway Association. He has been engaged in street railway work since 1890, both in the operating and manufacturing ends.

Patrick Troy has been appointed shop foreman of the New York & Queens County Railway, Woodside, N. Y. Mr. Troy had until recently been general foreman of car repairs of the Third Avenue Railway System. He has been engaged in work in the street railway field in New York City since he entered the employ of the Metropolitan Street Railway in 1897.

William I. Whitefield is now electrical engineer of the Roanoke Railway & Electric Company, Roanoke, Va. He replaces W. G. Clayton, who was assistant general manager and electrical engineer.

Halbert O. Crews, appointed to take charge of general publicity work for the Chicago Surface Lines, assumed his duties on Feb. 4. Mr. Crews went to Chicago from Springfield, Ill., and entered the utility field with a broad background of newspaper and publicity experience. He was managing editor of the *Springfield News Record* from 1913 until that paper was sold in 1919 and suspended publication. In 1918 he was publicity manager for the Illinois Centennial Commission and has since been engaged in general editorial and publicity work. As superintendent of reports for the State of Illinois in 1920 and 1921, he edited all state reports prepared during that period. During the recent campaign for a new constitution in Illinois Mr. Crews, as secretary of the committee on submission, was in charge of publicity. He has also edited the last four blue books, which are issued every two years by the Secretary of State.

Willard F. Graves has been appointed chief engineer of the Terre Haute, Indianapolis & Eastern Traction Company, with headquarters at Indianapolis. Mr. Graves was formerly for nine years chief engineer of the Montreal Tramways. He has also been connected in the past with the South Side Elevated Railway, Chicago, and the Chicago City Railway and has acted in a consulting capacity at various times for the Detroit United Railway, the Halifax Tramway & Power Company and the Quebec Railway, Light, Heat & Power Company. He has served as chairman of the committee on way matters of the American Electric Railway Engineering Association. A portrait and a biography of Mr. Graves were published in the *ELECTRIC RAILWAY JOURNAL* for Dec. 1.

M. H. Frank Has Had Varied Career in Utility Field

M. H. Frank, the new manager of the electric railway department of the Eastern Wisconsin Electric Company, at Fond du Lac, Wis., has had many and varied experiences in the utility field. His earliest connection dates back to June, 1908, when for G. W. Thornton & Sons, in Elkhart, Ind., he operated a traction engine for a threshing outfit. He later served with the Fort Wayne Electric Works, in Fort Wayne, and still later with the Indiana & Michigan Electric Company as assistant construction engineer, and then as resident engineer. In September, 1913, he became identified with the Fargo Engineering Company, in Jackson, Mich., as assistant testing engineer.

From June, 1916, to April 15, 1918, he was associated as operating engineer with the Galesburg Railway, Lighting & Power Company in Galesburg, Ill. In this capacity he had direct charge of all construction work. He also managed the city railway and interurban railway systems, along with



M. H. Frank

his work of general operation covering manufacture of electricity and distribution of electricity for light and power purposes. In 1918 he joined the forces of the Eastern Wisconsin Electric Company in Fond du Lac as manager of the gas and electric end of the business, but in 1922 he was made manager of the electric utilities of the Eastern Wisconsin Electric Company, supplying the city of Sheboygan. This placed him in direct charge as manager of all the electric and gas utilities of the Eastern Wisconsin Electric Company. On Jan. 1 of this year, in addition to the above activities, he assumed management of the electric railway lines as well. Mr. Frank completed a four year course in electrical engineering, receiving the degree of bachelor of science in electrical engineering and an advance degree of electrical engineer.

In his new position with the Eastern Wisconsin Electric Company, reference to which was made previously in the *ELECTRIC RAILWAY JOURNAL*, Mr. Frank succeeds B. W. Arnold.

John S. Allen has been selected by the Madison Railways, Madison, Wis., to fill the position of consulting engineer to that company. For the last three years Mr. Allen has been engaged in consulting engineering practice at Madison. Before that he was a member of the State Railroad Commission for four years. His experience with that body has given him an opportunity to gain a keen interest into the affairs of the company. In his first duties he will deal with relations between the riding public and the company. Mr. Allen will continue his private business.

E. L. Marriage, for the last two years in charge of public relations for the Des Moines City Railway as assistant to F. C. Chambers, president of the company, has been elected to the board of directors of the company. Since Mr. Marriage joined the Des Moines organization two years ago the change in public sentiment toward the company has been little short of remarkable. Mr. Marriage has not hesitated to tell the public of the betterments made by the company in its service and to the physical property. In this work he has used newspaper advertising, car cards and various other media. A little folder placed in racks in the cars every week called the "City Railway News" has been an important factor in this educational work.

C. J. Crampton, formerly superintendent of the safety and efficiency department of the Dallas Railway, has been placed in charge of the newly created public relations department of the company, the central idea of which will be merchandising service. Mr. Crampton has been relieved of all duties in connection with the operation of the Dallas Railway and will devote his time exclusively to the department of public relations, in which he will be the contact man between the public and the railway. As explained elsewhere in this issue of the *ELECTRIC RAILWAY JOURNAL*, the department of safety and efficiency has been abolished and the safety work heretofore carried on by Mr. Crampton for the company has been turned back to the operating department.

R. W. Curran, formerly general superintendent of the St. Joseph Railway, Light & Power Company, St. Joseph, Mo., has been appointed general superintendent of the Portsmouth Street Railroad & Light Company, Portsmouth, Ohio. This property was recently acquired by the Henry L. Doherty interests. Mr. Curran served a year and a half with the Doherty interests in Denver, following which he worked for a year at Massillon, Ohio, and a year and a half at Elyria, Ohio. Later he spent a year in the New York Doherty office, to be followed by three years service with the Dominion National Gas Company of Buffalo, N. Y. He was identified with the Ohio Public Service Company of Warren, Ohio, for five years. It was from Warren that he went to St. Joseph, where he held the position of general superintendent for a year. As noted previously his place at St. Joseph has been filled by D. C. McClure of Denver.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

\$2,146,506 Net for Brill Car Building Concern Enjoys Good Year —\$100,000 Set Aside to Develop Self-Propelled Vehicle Field

For the year 1923 the combined output of the four plants of the J. G. Brill Company amounted, in sales value, to \$18,167,486.

The combined output for each of the past six years follows:

1918	\$16,761,155
1919	14,210,622
1920	17,537,293
1921	7,647,899
1922	10,177,583
1923	18,167,486

The net profit of the company for the year was \$2,146,506 after deducting from the earnings the cost of maintenance and repairs, amounting to \$592,035, together with all other charges, and after setting aside out of earnings the following reserves—for depreciation of plant and equipment, \$231,148; for federal and state income taxes, not yet

CONSOLIDATED PROFIT AND LOSS ACCOUNT OF THE J. G. BRILL COMPANY AND SUBSIDIARIES FOR YEAR 1923

Total net sales billed.....	\$18,167,486
Cost of sales, including operating, selling, administration and general expenses and depreciation for the year.....	15,525,021
Miscellaneous income	\$2,642,465
Operating profit	101,937
Less reserves:	
For federal and state income taxes	\$2,744,402
For special depreciation	\$347,896
For development of gasoline - propelled vehicles	150,000
	100,000
	597,896
Net profit to surplus.....	\$2,146,506
Earned surplus at Dec. 31, 1922.....	\$3,582,971
Less:	
Adjustments of patents and good will.....	\$199,670
Miscellaneous adjustments—credit	16,499
	183,171
	\$3,399,800
Add profit as above.....	2,146,506
	\$5,546,306
Less dividends paid:	
Preferred	\$320,600
Common	240,510
	561,110
Earned surplus at Dec. 31, 1923	\$4,985,196

due, \$347,896; for special depreciation, \$150,000; and for development of gasoline-propelled vehicles, \$100,000.

The amount of work on hand at the close of the year was \$3,500,000.

Since the organization of the company in 1907, it has been customary, in making the annual report, to show as one item, under "value of properties," the amount carried on the books as representing the real estate, buildings and equipment and an amount representing patents and good will. It

was felt that a restatement of this entire account should be made to set forth more clearly the exact condition of the company, and an appraisal was made to determine the present value of the real estate, buildings and equipment owned by the company. It indicated a substantial, increased present value over the depreciated book value. Although the good will and patents are considered to be extremely valuable, the directors decided to reduce their value to the nominal amount of \$1 each, and to substitute as far as possible the increased tangible value shown by the appraisal, charging the balance, \$199,670, against earned surplus.

Believing that there is an increasing demand for gasoline-propelled passenger vehicles for use both on steam railroads and on the highways, the company has been taking steps to increase the efficiency of this class of transportation equipment and has decided to set aside a reserve of \$100,000 for further development of this branch of the business.

Historical Railway Booklet Published

The Westinghouse Electric & Manufacturing Company has recently released a fifty-four-page publication entitled "A brief Outline of the Development and Progress of the Electric Railway Industry." This booklet sets forth briefly the history of the electric railway industry, from the installation of the first permanently fixed rails to the production of the powerful electric locomotives of today. A wealth of illustration, including photographs of modern equipment and sketches of the earliest railway apparatus, adds greatly to the interesting character of the publication.

In the introduction, "Reminiscences of Electric Railway Development,"

L. M. Aspinwall of the Westinghouse company discusses the early trend of railway motor design and the problems encountered in the development of control apparatus.

Chapter 1 of the booklet includes the evolution of electric railway transportation from 1700 to 1885, describing the various inventions and experiments in the early stages of its history. This chapter is followed by a résumé of the development and service of the Westinghouse company in all branches of the electrical industry.

Chapters 3 and 4 recount the development of railway motors and control from the building of the first double reduction motor to the extensive equipment being manufactured today.

Electric railway history from 1894 to the present is set forth in the next chapter, after which a story of the first interurban railway in the United States is recounted. A discussion of freight haulage by the electric railway and the past and present tendencies of electric railway cars are included in the next chapters.

Succeeding chapters in the publication portray the extensiveness of Westinghouse service and the methods of the company in rendering effective service to its customers through various works, offices, service stations and warehouses, and through engineering studies and many informative publications and advertising programs.

Equipment maintenance and upkeep for electric roads is treated briefly in a four-page discussion of that subject. A short description of the electric railway industry as it is today concluded the publication.

O.B. Salesmen Use the Trolley

When Ohio Brass Company salesmen are called in for their annual sales conference a special car is chartered for their use in traveling between their hotel and the main office of the company where the business sessions are held. This special trolley has become a well-established feature of the annual sales convention. The car is provided in Mansfield by the Ohio Public Service Company. This is just another sample of how manufacturers can cooperate with railway companies—when they stop to think about it.



Manufacturer Charters Car for Use at Salesmen's Meeting

Metal, Coal and Material Prices

	Feb. 13, 1924
Metals—New York	
Copper, electrolytic, cents per lb.	12.75
Copper wire base, cents per lb.	15.375
Lead, cents per lb.	8.275
Zinc, cents per lb.	6.737
Tin, Straits, cents per lb.	54.00
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	\$4.825
Somerset mine run, Boston, net tons.	2.25
Pittsburgh mine run, Pittsburgh, net tons.	2.00
Franklin, Ill., screenings, Chicago, net tons.	1.825
Central, Ill., screenings, Chicago, net tons.	1.35
Kansas screenings, Kansas City, net tons.	2.25
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$6.60
Weatherproof wire base, N. Y., cents per lb.	17.00
Cement, Chicago, net prices, without bags.	\$2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	\$0.95
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots.	11.74
Turpentine, (bbl. lots), N. Y., per gal.	\$1.00

Rolling Stock

Birmingham Railway, Light & Power Company, Birmingham, Ala., will receive twenty new cars on March 1.

Wheeling Traction Company, Wheeling, W. Va., has placed an order with the Cincinnati Car Company at Winton Place, Ohio, for twenty-one new passenger cars.

Los Angeles Railway has ordered 722 Westinghouse type 514-L motors to equip the 120 new cars being purchased and built as a part of the 1924 program. Some of these motors will be used for replacing older equipment now in service. A number of two-motor cars are to be made four-motor cars this year and 100 controller equipment units of type K-35 have been ordered for four-motor cars and 300 type K-68 controllers have been ordered for two-motor cars. The new controllers are to be furnished by the General Electric Company.

New Brunswick Power Company, St. John, N. B., is remodeling and refitting a number of old cars.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., will soon place in operation between Waukesha and Milwaukee five new buses. The company suffered by fire on Feb. 8 considerable damage to seven of its city cars in its Fond du Lac carhouse.

United Electric Railways, Providence, R. I., recently bought three Fageol safety coaches.

Track and Line

Menominee & Marinette Light & Traction Company, Marinette, Wis., is requesting authority of the Marinette Common Council to install additional overhead and track facilities in Dunlap Square.

Canadian National Railways, Montreal, Que., proposes to spend approximately \$500,000 in improvements in 1924 extending its local service in St. Catharines, Ont.

Los Angeles Railway started the extension of the Central Avenue line from the south terminal at the Goodyear plant to Seventy-seventh Street on Feb. 1. This is the second extension started since the first of the year, the

other being the extension of the West Ninth Street line from Harvard Boulevard to Western Avenue, where it will connect with the crosstown bus line. The Ninth Street extension calls for $\frac{1}{2}$ mile of double-track construction and the Central Avenue line will be extended 0.4 mile.

Tri-City Railway of Iowa, Davenport, in line with its comprehensive rerouting program built 1,500 ft. of single track and constructed eight passing tracks in various parts of the city. In the service improvements installed were sixteen Nachod automatic electric blocks at a cost of \$15,000 to speed up the movement of cars on single-track lines and six Cheatam electric track switches.

Alabama Power Company, Birmingham, Ala., is rebuilding a number of the trolley lines in Tuscaloosa. Many new rails and new ties are being placed, while some of the grades are being changed. With the exception of a short stretch the work of rebuilding the Holt line is completed and work is now progressing on the loop line. The company recently acquired control of the Tuscaloosa railway system.

Pacific Electric Railway, Los Angeles, Cal., has requested permission to construct a single track at grade across Commercial and Canal Streets in Long Beach.

Power Houses, Shops and Buildings

Ottawa Traction Company, Ottawa, Canada, is constructing a new modern brick and cement building for the purpose of housing a new substation and providing linemen's quarters. When completed and the new substation installed it is expected it will add materially to the effectiveness of the power distribution system.

Virginia Railway & Power Company, Richmond, Va., has purchased four Westinghouse new model multiple re-tort underfeed stokers and four new 512-hp. B & W boilers to be installed in a new extension to the Reeves Avenue power station at Norfolk, Va. Electrical auxiliaries have also been purchased for the Twelfth Street power house of this company at Norfolk.

Chautauqua Traction Company and Jamestown, Westfield & Northwestern Railway will build two automatic substations, according to an announcement by George L. Maltby, general superintendent. The new substation at Stow replaces the one damaged by fire a few weeks ago, and the new substation on the Jamestown, Westfield & Northwestern will be erected at Glenn Ewen, a point about half way between Mayville and Westfield. The portable rotary substation now in use at Westfield will be moved to some point on the Jamestown, Westfield & Northwestern line, probably at Dewittville, Mr. Maltby, indicated. Work on the new automatic substations will start soon and they will be completed and fully equipped and ready for service in four or six months. The substations are to be of concrete, fireproof construction and will be 500-kw.

Trade Notes

United States Light & Heat Corporation, Niagara Falls, N. Y., announces that effective March 1, R. M. Kincaid, who has been works manager since August, 1920, will resign to accept a position with the Garford Motor Truck Company of Lima, Ohio. J. K. Gould will carry on that part of Mr. Kincaid's work which had to do with the manufacture of batteries, his title being superintendent battery division. Otto Von Goeben will carry on that part of Mr. Kincaid's work which had to do with the device and arc welder end of the business, his title being superintendent device division. The corporation manufactures U. S. L. storage batteries, arc welders and train lighting equipments.

Okonite Company, Passaic, N. J., manufacturers of "Okonite" insulated wires and cables, splicing tapes, etc., has recently appointed the Engineering Materials, Limited, McGill Building, Montreal, P. Q., as its Canadian representative.

N. A. Petry Company, Inc., Philadelphia, makers of the Petry Bus Heating System, announces the appointment of E. R. Mason as Eastern sales representative. Mr. Mason has been associated with the Electric Service Supplies Company as Eastern sales manager, and with the Ohio Brass Company as assistant general sales agent. Mr. Mason is located at 1845 Grand Central Terminal, New York City.

Mitchell-Rand Manufacturing Company, New York, N. Y., while essentially maker of industrial and insulating compounds, is also distributor and representative for manufacturers of varnished materials, insulating tapes, etc. Recently the Mitchell-Rand company arranged to act as Eastern distributor for the Plymouth Rubber Company, Inc., Canton, Mass., and now carries in its warehouse at 18 Vesey Street, New York City, a complete stock of Plymouth friction tapes and splice, insuring immediate deliveries at no advance over prices prevailing at the mill. Maurice J. Deegan, who has had extensive experience in the sale of these materials throughout the country, is supervisor of the new tape and splice department of the company.

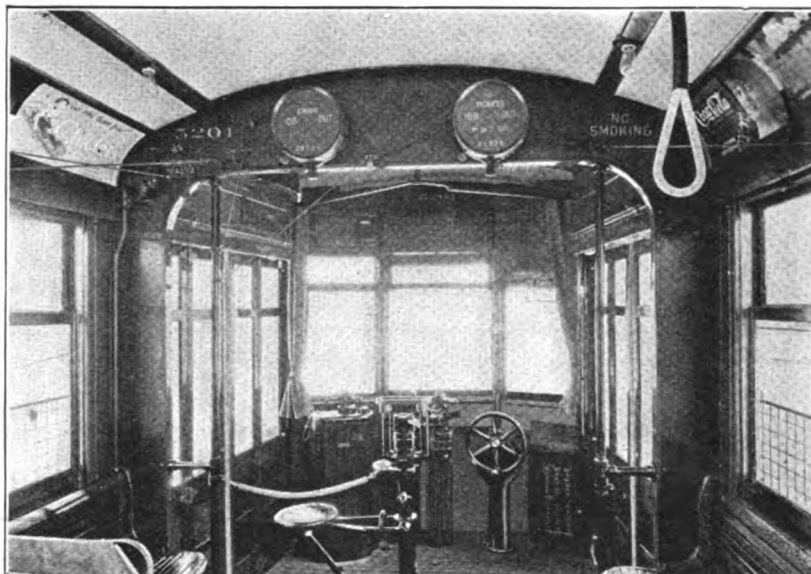
New Advertising Literature

International Steel Tie Company, Cleveland, has issued a folder entitled "Years Later." It explains how the second rail goes in on a steel tie foundation. The pamphlet tells in detail about a particular track job undertaken for the Cleveland Railway and its resulting revelations as to the wearing qualities of concrete foundations.

Pennsylvania Crusher Company, Philadelphia, has issued Bulletin 1014, illustrating and briefly describing "Pennsylvania" steel-built hammer mills for cement, lime and gypsum plants.

Hisey-Wolf Machine Company, Cincinnati, has issued Bulletin 3016-S describing a new wide swing motor-driven grinder.

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It's equipped with—

PEACOCK Staffless Brakes

It doesn't take a strong motorman to stop this car with the hand brake. Maybe he'll never have to. But it's there and ready and capable of stopping the car, if the necessity arises.

With only the average man's strength applied on the handwheel, a Peacock Staffless Brake can develop braking power enough to skid the wheels—and that means more than enough. Moreover a Peacock Staffless Brake will never clog with chain—it has "*capacity*" enough to handle any amount that's necessary.



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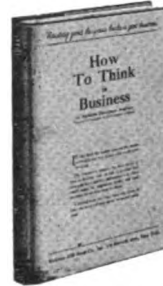
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The book supplies methods and principles of good business talking, without being guilty of laying down cut-and-dried rules for gestures, "stage manners," etc. The whole aim of the book is to train the reader so that by a process of self-development he can make the best use of his own intelligence and ability both in preparing the speech and in delivering it.

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E. 2-16-24

Cost to Install

⑥

The 1923 Committee on Way Matters of the A.E.R.A. reported at the Atlantic City convention as follows:

"It was agreed that a substitute tie should meet the following requirements:

- | | | |
|--|---|---|
| 1. Resiliency. | → | The fundamental principle of the DAYTON RESILIENT TIE. |
| 2. Hold rail to gage. | → | Held securely by bolts accurately located in steel cross members. |
| 3. Provide sufficient bearing area. | → | By protecting the concrete from breaking or pulverizing, the Dayton Tie converts the entire roadbed into bearing surface. |
| 4. If expected to last for more than one set of rails, that easily renewable fastenings be provided. | → | Readily accessible bolt fastenings provide for rail renewal. |
| 5. Be easily installed by ordinary track workers. | → | Eight ordinary track laborers, by actual test, have laid 1,000 feet of Dayton Resilient track in a single day. |
| 6. Cost installed should be reasonable." | → | Dayton Resilient Tie Track costs \$2,000 per mile less than wood ties in gravel ballast. |

DAYTON

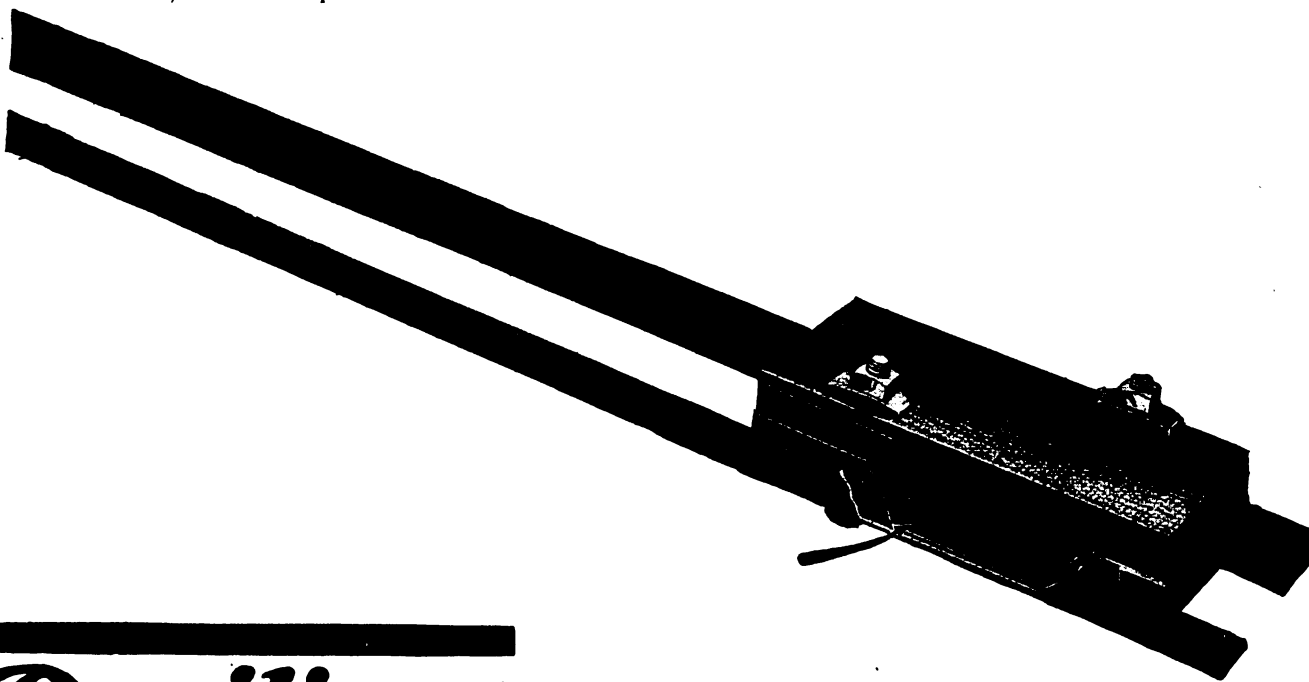
is Far Less Than Wood Ties

The sixth and last requirement that a substitute tie should meet, the Way Committee says, is *reasonable installation cost*.

The Dayton Resilient Tie meets this test just as well, if not better, than the other five requirements already referred to in this series. Dayton Resilient Tie Track costs \$2,000 a mile *less than wood ties in gravel ballast*. The saving over wood ties laid in concrete foundation is more than \$6,000 a mile.

Not only is the *first cost* lower, but the life of the track is greatly increased by the use of Dayton Resilient Ties. The resilient feature preserves the track foundation from disintegration caused by vibrations and shocks. Paving along the track, especially at the joint, will not heave up or settle down. The joint tie is so constructed as to afford a broad bearing surface for the rail. This protects the most vulnerable portion of the track.

In short, Dayton Resilient Ties remove the CAUSE of all track failure. To think of the Dayton Resilient Tie as a "substitute" tie is not quite fair. For it is infinitely better than wood ties, as has been proved in actual service.



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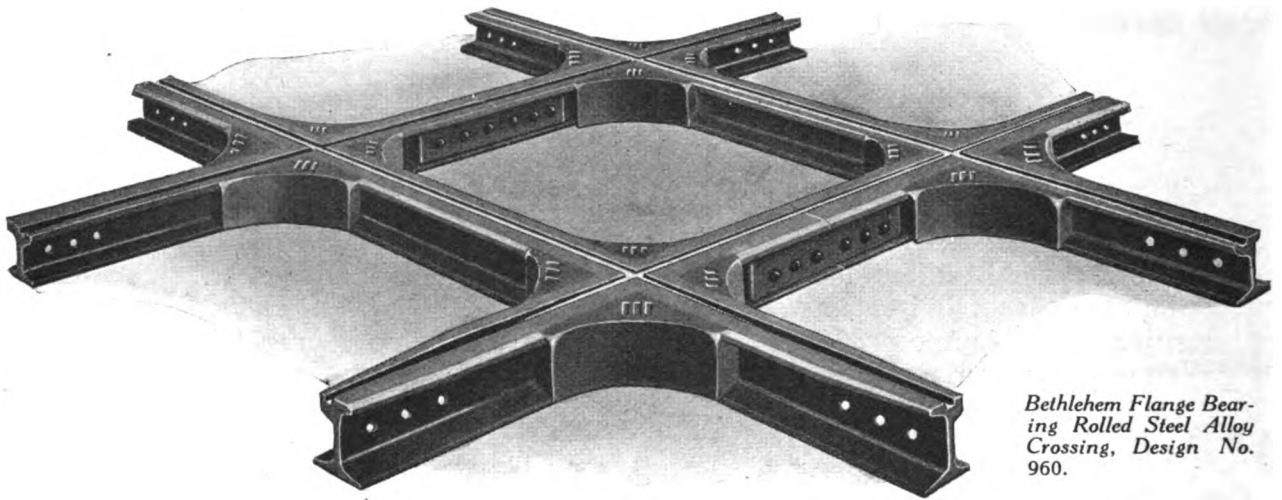
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BETHLEHEM

Alloy Steel Crossings



Bethlehem Flange Bearing Rolled Steel Alloy Crossing, Design No. 960.

Rolled Alloy Steel—Design 960 Crossing, illustrated above, is made of a special rolled rail of Mayari chrome-nickel steel. The head of the rail is rolled full and the flange-ways are machined to suit individual conditions. The rails are iron-bound, or cast welded into one solid piece and are made continuous in one track. The entire wearing surface of the crossing is of rolled alloy steel, eliminating abrupt changes in hardness between the various parts such as are found in hard center construction.

Continuous Flange Bearing—The groove or flangeway is machined in the alloy steel rail head to any desired depth. These grooves are maintained at a constant level the length of the crossing and provide continuous flange bearing surfaces for the

wheels. The inclines at the ends are long and gradual and the whole arrangement assures easy riding and comparatively noiseless operation.

Weldable—There is an insistent demand for special track work that can be welded or restored after wear has developed. Design 960 Crossing can be welded or restored by either the electric arc or oxy-acetylene welding process. Welds in special work made of rolled steel are much more reliable than those in cast construction.

Mates and Frogs—The material used in the manufacture of this crossing is also used in mates and frogs, of standard construction, 7 inches or 9 inches deep. All these designs are especially recommended for heavy traffic.

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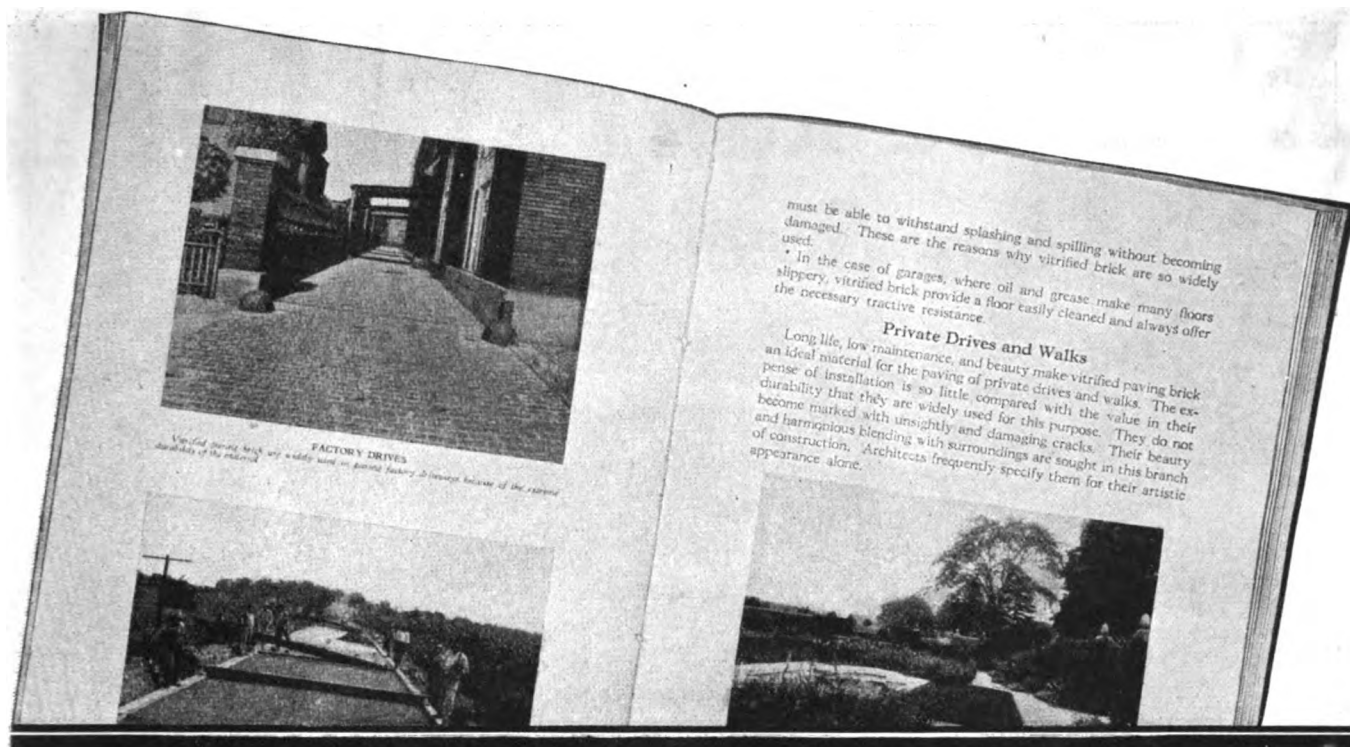
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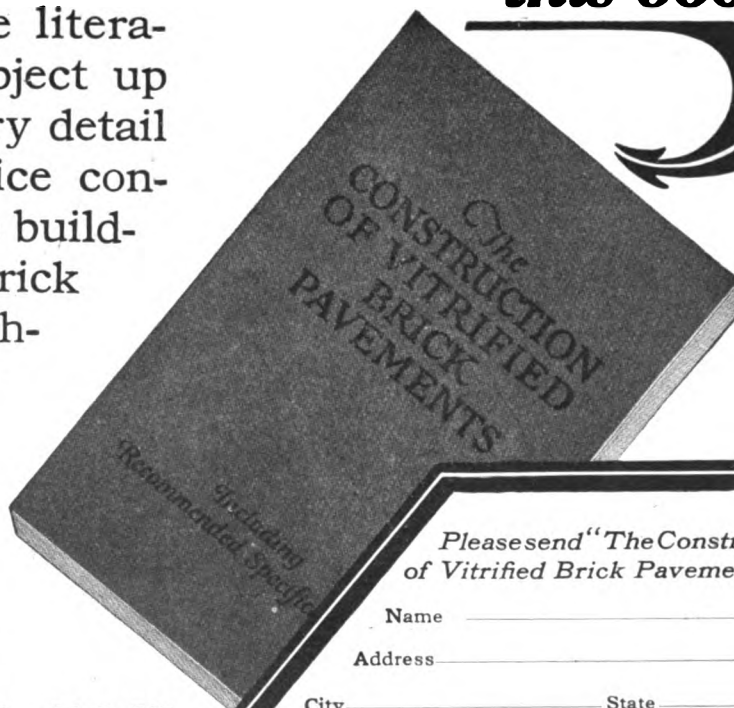
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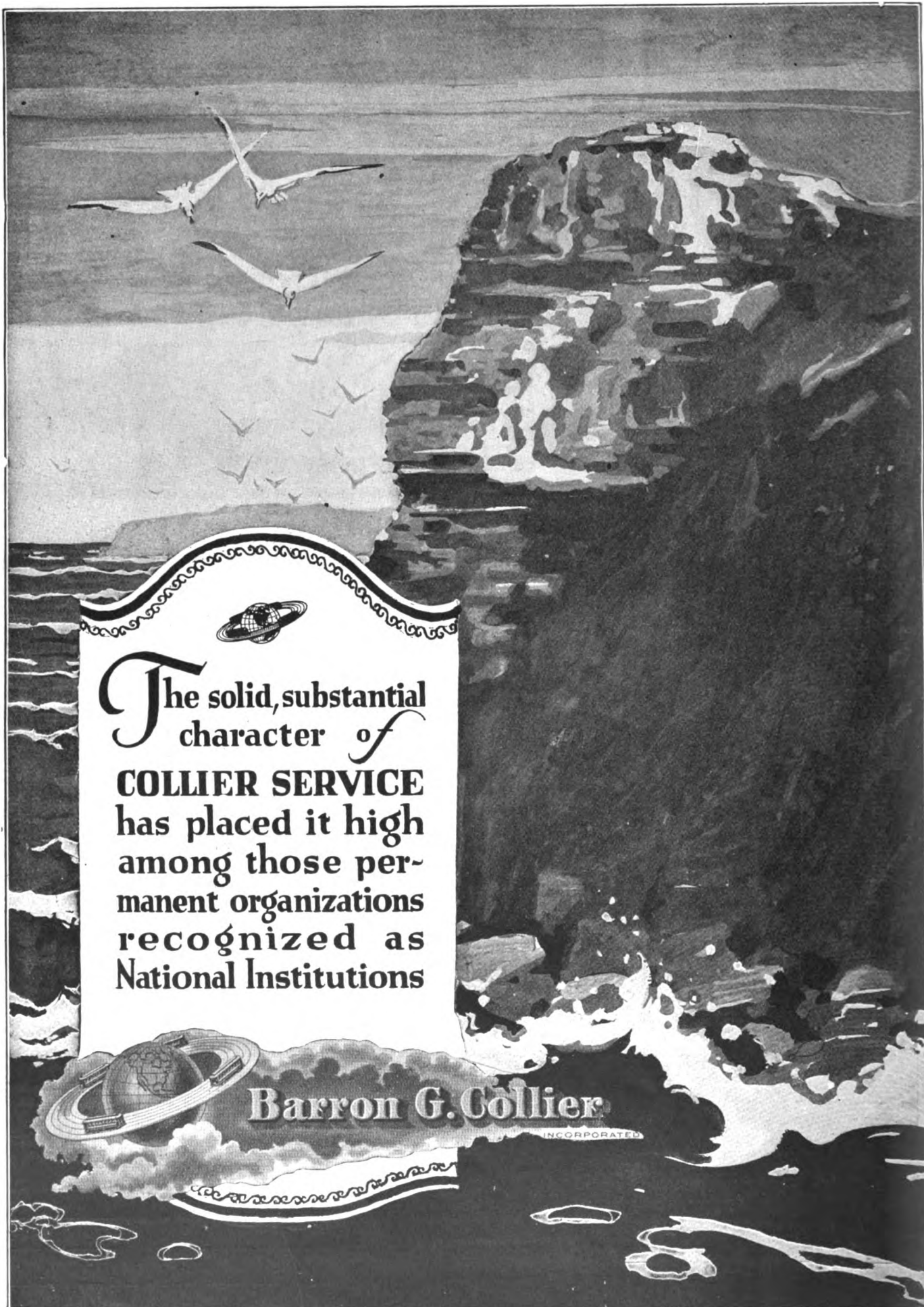
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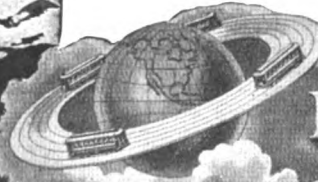
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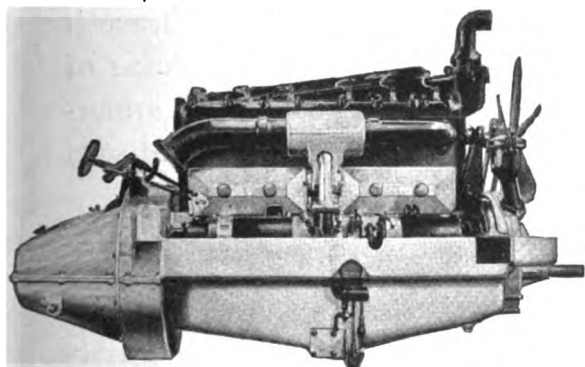
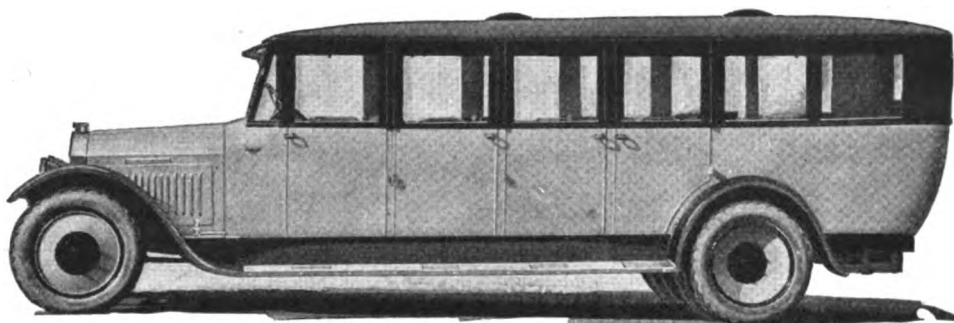
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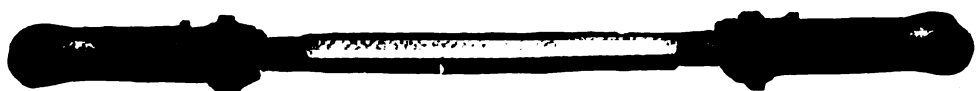
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Standard Motor Journal Oils, Standard Gear Grease, Standard Curve Grease and Standard Compressor Oils will keep down your lubricating costs per car mile, just as they are doing for other traction companies. We have the names of these satisfied customers on file and will be glad to refer you to them.

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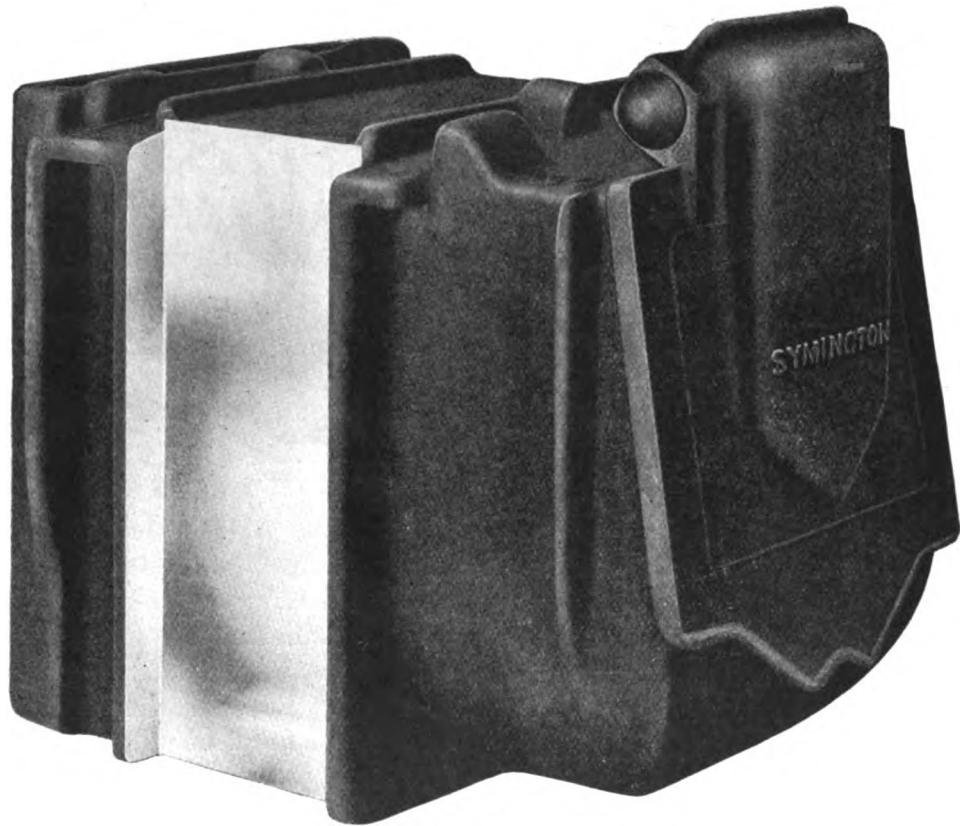
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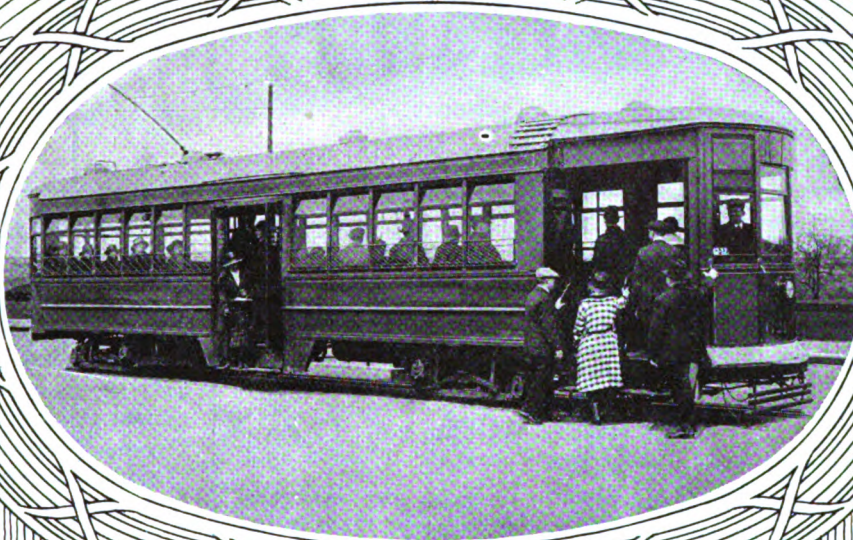
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"—We have fewer dewirements with shoes as they stay with the wire much better than wheels."

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"—they give much better contact and stick to the wire better than wheels."

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"—find that they hold the wire better than wheels on our lines."

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"—give much better and more constant contact."

"—more economical than wheels."

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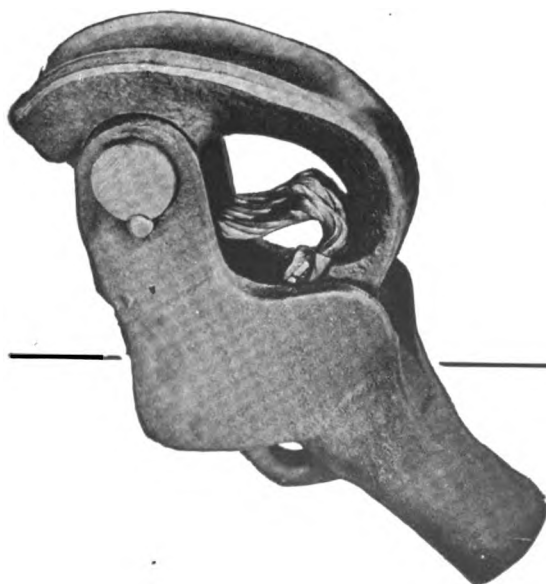
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"—more mileage, better contact."



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- [7] Names and addresses of consulting engineers, if any.
- [8] Location of power plants.
- [9] Number and make of generators, stating capacity, voltage, whether d.c. or a.c., and if a.c., phase and cycles.
- [10] If water power is used, total horsepower and make of hydraulic turbines.
- [11] If steam power is used, total horsepower and make of boilers, engines, and kind of fuel.
- [12] Transmission voltage.
- [13] Voltage of lighting circuit, whether d.c. or a.c., and if a.c., phase and cycles.
- [14] Voltage of motor circuit, whether d.c. or a.c., and if a.c., phase and cycles.
- [15] Details of city contract, showing number, size and type of lamps used and rate received.

- [16] Number of meters.
- [17] Total connected power load.
- [18] If energy is purchased, from whom and number, capacity and make of transformers.
- [19] Whether or not day and night service is furnished.
- [20] Keyed for quick reference to show companies using direct current.
- [21] Having day service.
- [22] Using gas or oil engines.
- [23] Doing steam heating.
- [24] Manufacturing ice.
- [25] Doing a lighting business.
- [26] Whether lighting and power transmission.
- [27] Whether also electric railway companies.
- [28] Whether using steam equipment.
- [29] Power transmission only.
- [30] Using water power.
- [31] Whether retailing electrical goods.
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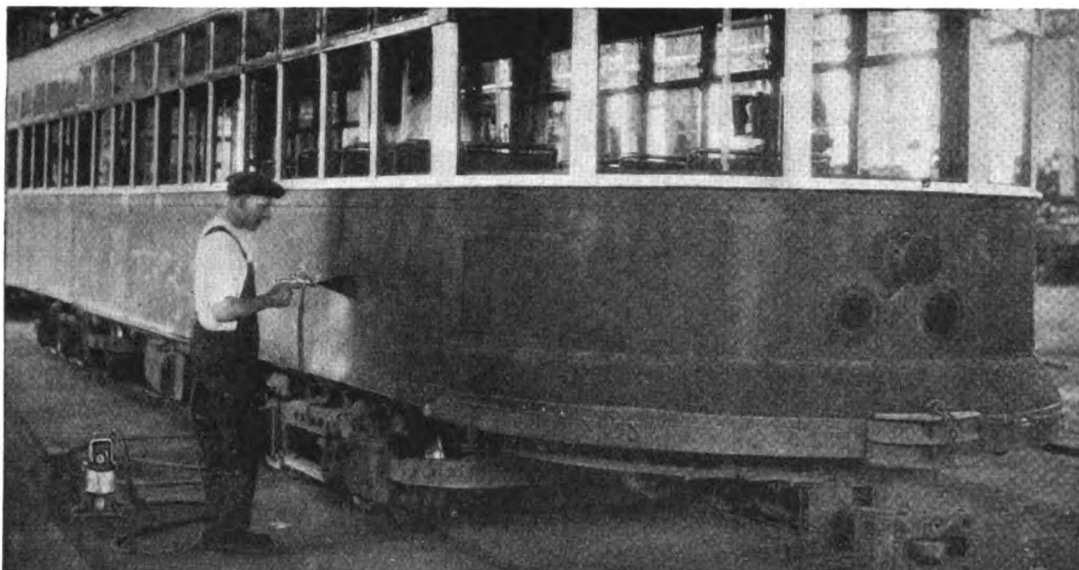
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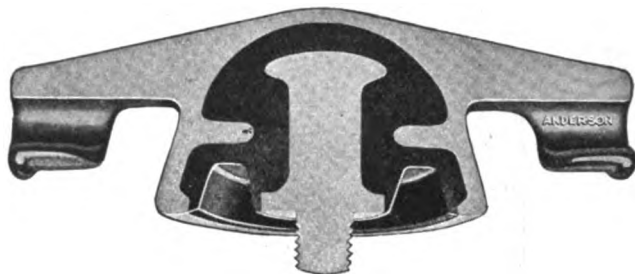
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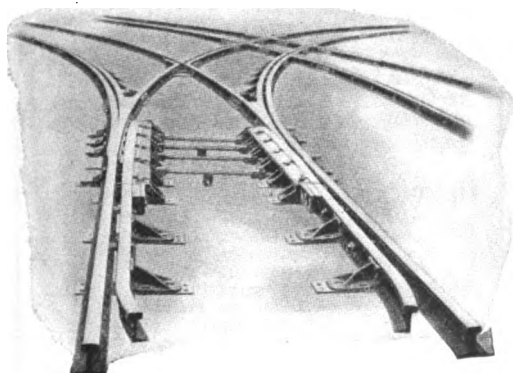
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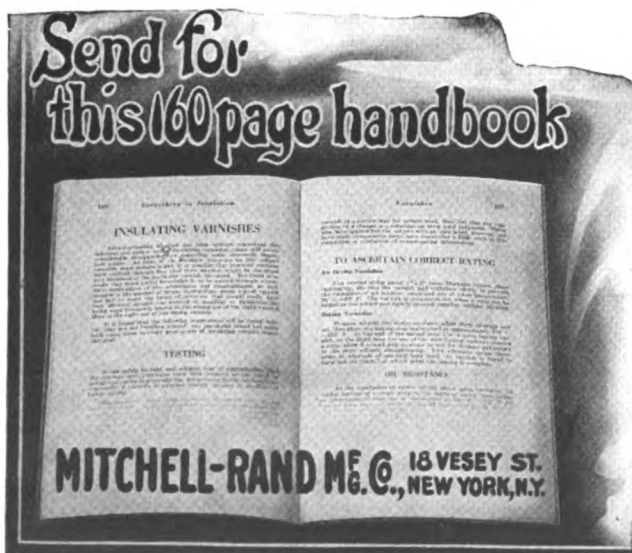


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but more than equal
to the original metal*

PAGE High Carbon Electrodes were used to build up the worn surface at the joint, and the deposit was then ground off flush with the rail.

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Another
 "Up to the minute" test on
"Tool Steel"
 vs.
Special Quenched



The "Tool Steel" pinion wore out after 239,136 miles.

Special quenched pinions wore out in 50,000 to 60,000 miles.

The History of the test:

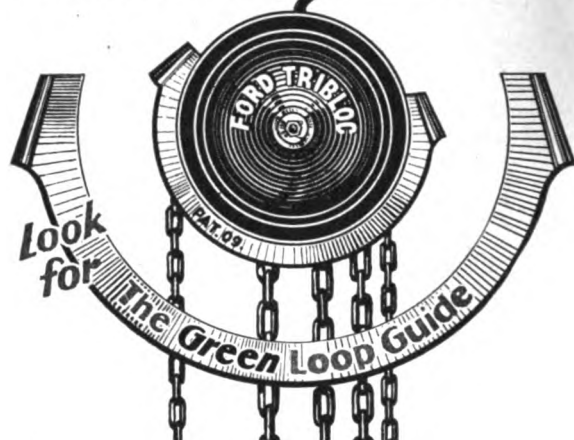
In Dec., 1917, test was started to demonstrate if "Tool Steel" could meet the guarantee of 50% greater life. (Guarantee has since been increased to 75% greater). Car No. 14 was equipped for test with "Tool Steel" gear and pinion on one motor and quenched gear and pinion on another. Micrometer measurements were taken and in the first 29,778 miles, the relative wear on the pinions was .020 in. to .078 in. The quenched pinion was removed and scrapped between 50,000 and 60,000 miles. (Exact record was lost. This mileage checks with the fact that it was half worn in 29,778 miles, also with average mileage they were obtaining for similar pinions on other cars). The "Tool Steel" pinion was worn out in 239,136 miles.

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THE Green Loop Guide is the mark of a good chain hoist. Good because of the high efficiency of its planetary gearing; because of its Patented Loop Hand Chain Guide which protects the hoist and controls the hand chain at all speeds of travel; because of its rugged construction throughout.

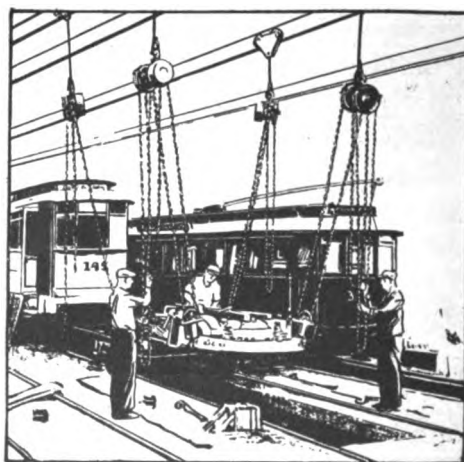
Ford Triblocs have 80% efficiency; an eighty-pound pull of one man on the hand chain of a 1-Ton Tribloc will lift a ton. Strong and compact. Made entirely of malleable iron and steel, except the Hand Chain Wheel, which is gray iron. Capacities from $\frac{1}{4}$ to 20 tons.

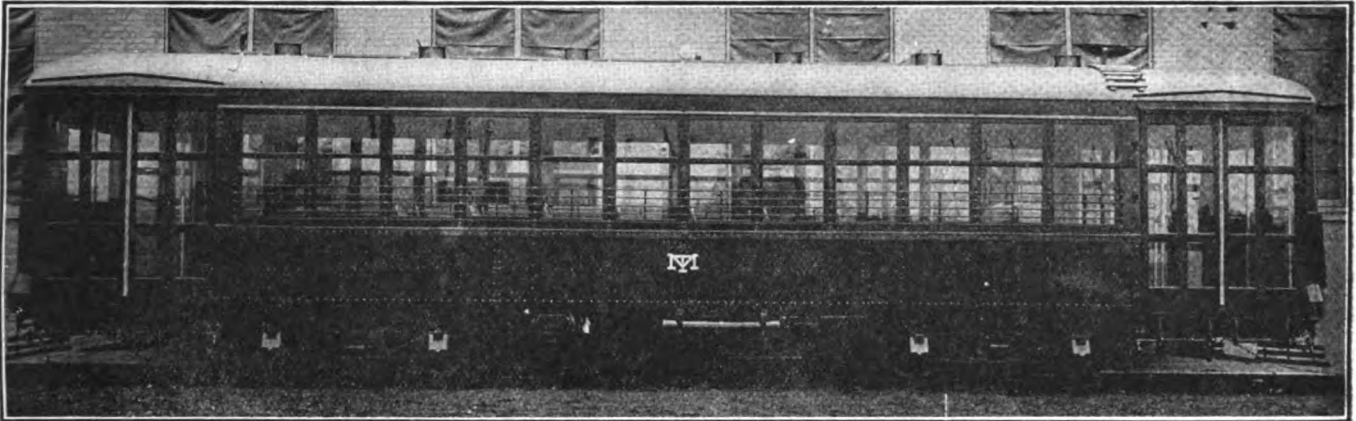
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Its high capacity (54 seats)—light weight (15 tons)—and one- or two-man operating arrangements have made it the outstanding recent advance in electric railway car design. Instant popularity has been its achievement. Can you use such a car?

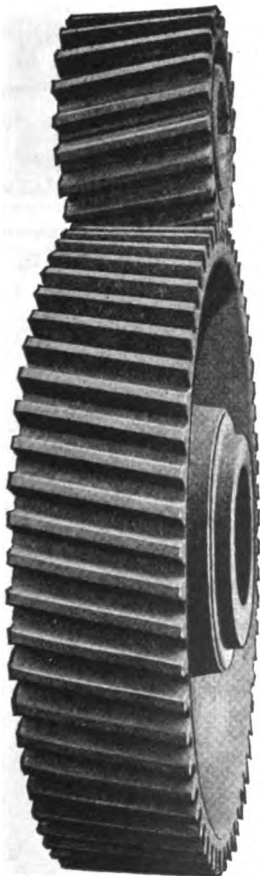
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St. Louis Car Company

St. Louis, Mo.

"The Birthplace of the Safety Car"

Of course
they are
"QUALITY"
CARS

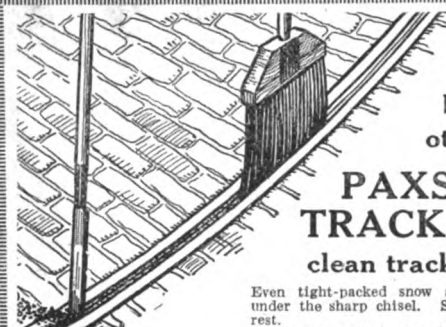


NO OTHER gear at any price assures you as good value for your money as the Nuttall BP Helical Gear. It saves your equipment, it saves 70% in gear cost and it lasts four times as long as any untreated gear.

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All Westinghouse Electric & Mfg. Co.
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on one end—
broom on the
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**PAXSON
TRACK BROOMS**
clean track in a jiffy

Even tight-packed snow and ice soon breaks up under the sharp chisel. Stout steel bristles do the rest.
A "just right" fit for all trackwork, frogs, crossings, etc. Used by leading properties for over 25 years. Send for a sample—you'll be pleased.

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Manufacturers
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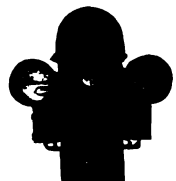
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Automatic
Signals

for Accessibility
and Reliability

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**"American"
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AUTOMATIC SIGNAL**
for single track block signal protection
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Peirce Feeder Pins are the strongest pins obtainable for points of excessive strain.
Their low cost permits their use over the entire system.

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Copper Clad Steel Wire
Insulated Wire of all kinds
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INSULATED WIRES AND CABLES
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TRENTON TOWER

This 3-Section

is not only more convenient, but stronger than the older type.

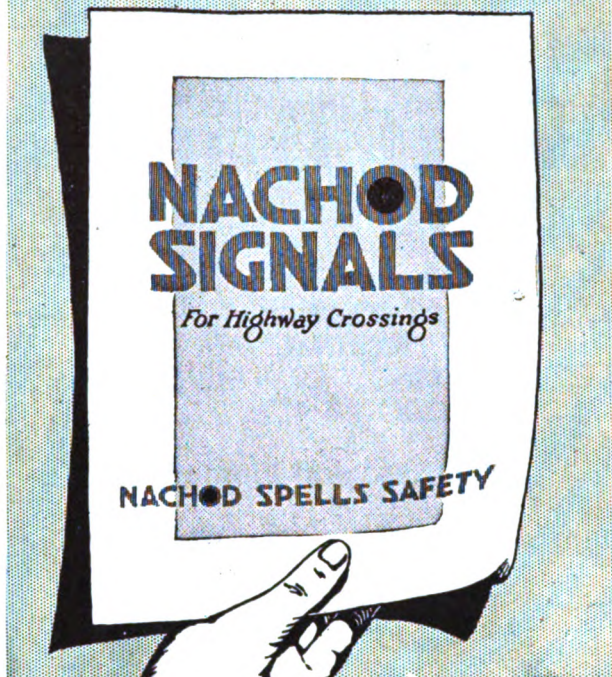
The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

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Cross Ties Bridge Timbers
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Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000.
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Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

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Est. 1848—Inc. 1870

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**CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX**

Arc Weld and Flame Weld

*Send for new
Rail Bond Book*

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FERALITE

An up-to-date and most economical process for the Aluminothermic welding of rail joints. Makes the joint stronger than the rail itself.



Feralite Welded Joint

Special advantages — (1) Rail ends are butted together and easily aligned, no inserts needed to fill in or adjust. (2) Smaller portions of material used. (3) Grinding reduced to the minimum, only a slight touching up is needed.

The Feralite Rail Welding Process eliminates rail joints at a lower cost than any other process. Write for full details.

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High-Grade Track Work

**SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
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CONSTRUCTION**

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Lorain Special Trackwork Girder Rails

Electrically Welded Joints

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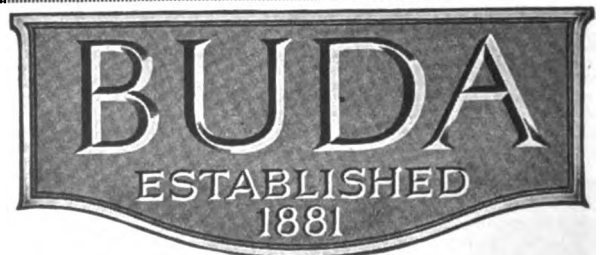
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**Design and Manufacture
of
Standard—Insulated—and
Compromise Rail Joints**

The Rail Joint Company
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Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
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ESTIMATES PROMPTLY FURNISHED



Special Track Equipment and Layouts
of all kinds

THE BUDA COMPANY
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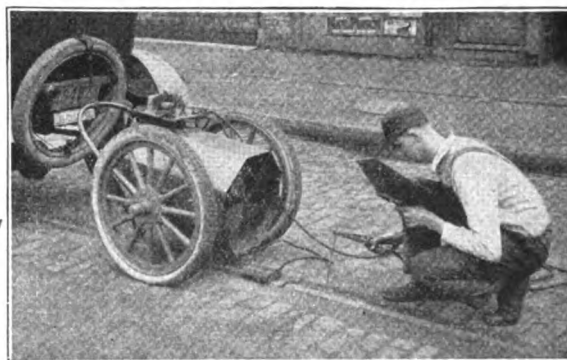
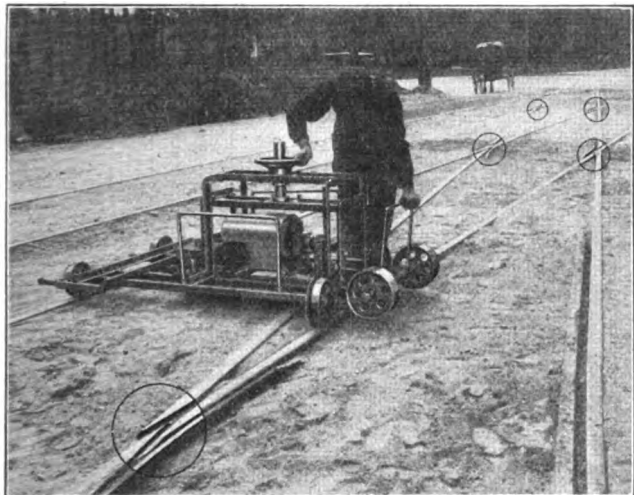
Track Grinding is inexpensive with **SEYMOUR** MIDGET RAIL GRINDERS

It's a one-man machine—easy to operate, easy to move, easy to maintain. Notice its simple, compact construction. Will do any kind of grinding, surface, gauge line, switch points, etc.

Especially desirable because its first cost is low.

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Light—Handy—Reliable Here's Why:—

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3. The operator cannot spoil the work by holding a long arc.
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5. The LITEWELD gives a good even deposit of metal right from the start.
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The Buckeye Jack Mfg. Co.

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Shaw Lightning Arresters

Standard in the Electric Industries
for 35 years

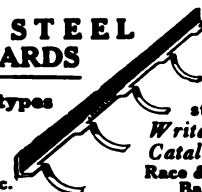
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Adapted to all types
of rails and
paving.

W. S. GODWIN CO., Inc.



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service to
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disintegration of
street railway paving.
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Return Switch
Stands
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RACOR Tee Rail
Special Work.
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GENERAL OFFICES: HILLBURN, NEW YORK
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Eliminate from track assemblage all spikes, plates, anchors, braces,
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REVOLUTIONIZES ROADBEDS

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PERFECT MICANITE INSULATOR

Reg. U. S. Pat. Off.

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Catalogs will gladly be furnished

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S-F



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If you want to make big savings on your sign, poster and general stencil work, ask us for further details on this process.

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of continuing reliability**

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**Makers of Steam Superheaters
since 1898 and of Chain Grate
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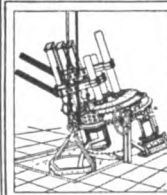
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Electrical Machinery, Steam Turbines, Steam Engines,
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Ten Standard Sizes 1/2 to 24 Tons Capacity
Most Rapid and efficient for making
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A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

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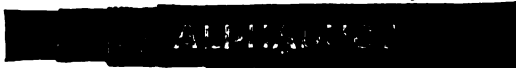
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Insulating Varnishes and Compounds

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For Every Type of Car



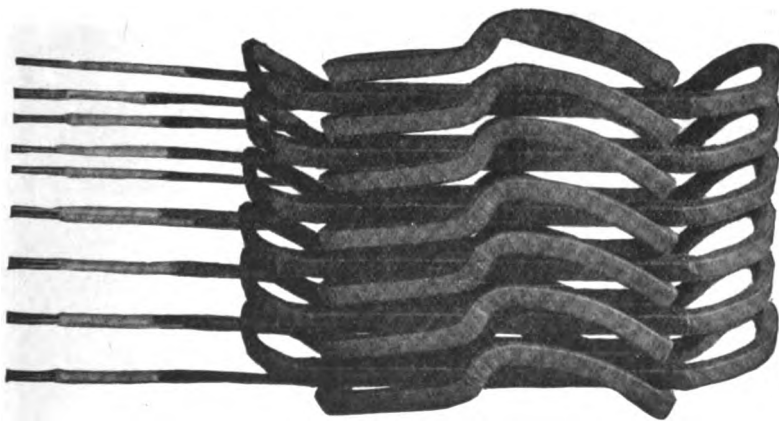
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Gives best mechanical pro-
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Your replacement coils should be absolutely
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A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill
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THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



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Gets Every Fare
PEREY TURNSTILES
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Use them in your Proprietary Areas and
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**Car Heating and Ventilation**

are two of the winter problems that you must
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Now is the time to get your cars ready for
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The Peter Smith Heater Company
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We manufacture Indicating and Recording Fare Registers, Receipt Issuing Taximeters, and Fare Boxes.

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Dayton, Ohio



Type "A"



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Fresh Air!

Cars now in service, poorly ventilated, can be provided with ventilating means at a cost negligible as compared with the results obtained.

Whether considering these cars, designing new cars, or rebuilding old ones, remember that efficient ventilation requires proper equipment.

N-L Ventilators are made to meet every demand.

Leading features of N-L Ventilators:

- positive and adequate exhaust
- weatherproof and dustproof
- inconspicuous and positively noiseless
- unsurpassed for ventilation and appearance.

Write for "Superior Ventilation" and prices



The Nichols-Lintern Co.
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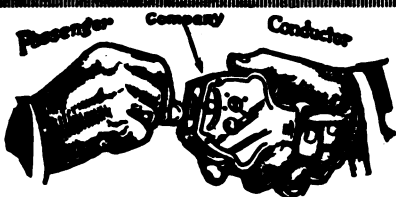
Some of the greatest railroad systems are large users of Haviland Rollers.

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Experience indicates that the large groove roller is the type most advantageous for car windows. We make rollers of that kind, as illustrated, to fit specifications. Prompt delivery and high quality are Haviland specialties.

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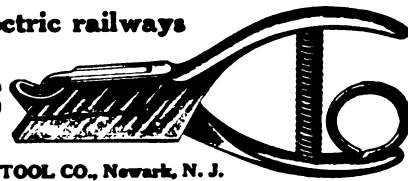
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75% of the electric railways
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B-V Punches

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Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
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For Every Class of Service

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Type R-10

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Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
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NATIONAL Light Metal Handholds

*Public Pleasing, Comfort Making
Dividend Aiding, Long-Lived*

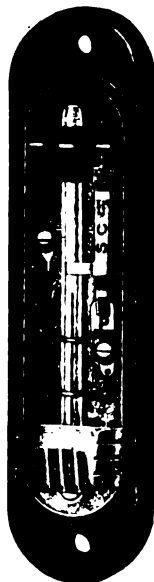
Designed to fit the passenger's hand, to make standing as comfortable as possible, and to last so much longer than the perishable leather straps, that the ultimate cost is far less. *Write for details.*

CENTRAL EQUIPMENT COMPANY
Englewood Ave., Buffalo, N. Y.

AGENTS:—National Railway Appliance Co., New York; Grayson Railway Supply Co., St. Louis; Hegeman Castle Corp., Chicago.

Utility New Type No. 8 Heat Regulator—

The Last Word in Thermostatic Control of Electric Heaters

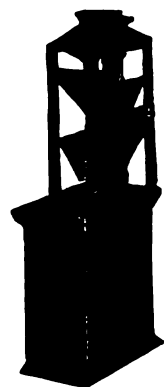


The new method of mounting our Thermostats renders them absolutely shock and tamper-proof. Using a soft rubber bushing at the top of the mercury tube and holding the bushing in a loose-fitting clamp give it the flexibility necessary to prevent the separation of the mercury column ordinarily occasioned by vibration of the car or shock through tampering by the crews. We have also added a spring contact "S C" and a permanent contact "P," as shown in illustration. Should the mercury tube be broken from shock or vibration, the spring contact "S C" will engage permanent contact "P," thereby closing an electric circuit that cuts off the heat.

IN THE NEW NO. 8 SWITCH we have eliminated the use of a Relay and have substituted an Eliminator, which takes the place of the Relay, so that the only movable part in the whole equipment is the main contactor, which cuts the heat in and out. We have also designed an Applicator, to take the place of Relays on any switches heretofore furnished by us, with complete instructions for making the change.

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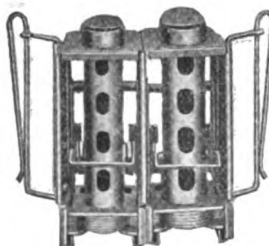
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**Fit the Fare and
Fare Collection System**

The Cleveland Fare Box Co.
Cleveland, Ohio

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JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

**100 New Users in the Last Nine Months
KASS SAFETY TREADS**

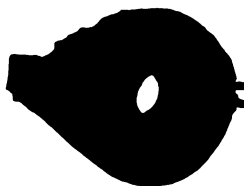
HIGH

in efficiency and lasting qualities

LOW

in weight, initial and upkeep costs

Morton Manufacturing Co., Chicago



CHILLINGWORTH

One-Piece Gear Cases

Seamless—Rivets—Light Weight
Best for Service—Durability and Economy. *Write Us.*

Chillingworth Mfg. Co.
Jersey City, N. J.

SAFETY TREADS

Universal Safety Tread Company

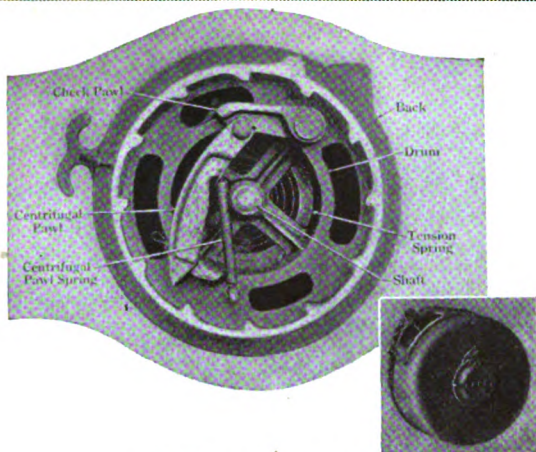
Offices in all Principal Cities

40 Court Street

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All new catchers are good—

But when they wear so that the pole is checked too late, they're junk. The short fat check pawl of

Earll Catchers and Retrievers

engages full face-on. No points or edges to wear or batter. Even aged Earlls check the pole as promptly as when new. Throughout an almost endless life they always operate promptly—another one of the five exclusive Earll Catcher and Retriever Features.

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Canadian Agents:
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Diamond "S" Steel Back is the Best Type



Standard
Patterns

for

**SAFETY
CAR**

D-67 for Narrow Treads
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30 Church Street, New York

332 So. Michigan Ave., Chicago Chattanooga, Tenn.

'CARNEGIE'
for
**WHEELS
AXLES
RAILS
CROSS TIES**

Carnegie Steel Company
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VELOX
WHY NOT
TRY
A GILBERT & SONS B.F. CO.
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Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

**FOR POSITIVE SATISFACTION ORDER
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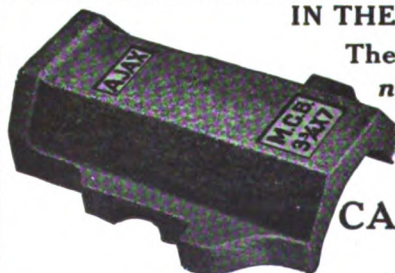
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Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts

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There are many cars
not equipped with



**AJAX
CAR BRASSES**

The cars that are equipped with Ajax Brasses keep
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The Ajax Metal Company

Established 1880

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POSITIONS VACANT

SALES engineer wanted, familiar with steam and street railway special track work, capable of securing field data for the manufacture of same. Must have had experience with manufacturer of special track work. State experience, approximate salary, age and education. P-648, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERVISOR of roadways and structures wanted for electric road in the East. Must be thoroughly efficient in the handling of material and labor and competent in the maintenance of city and interurban track. State experience, salary expected and when available. P-654, Elec. Ry. Jour., 10th Ave. at 36th St., New York.

POSITIONS WANTED

SUPERINTENDENT of transportation, at present with large property, solicits correspondence with managers that are in the field for a superintendent of wide experience. Capable progressive and recognized as an economical painstaking official. High-grade references. Personal reasons for desiring a change. PW-653, Electric Railway Journal, Leader-News Building, Cleveland, Ohio.

WANTED to locate with city or interurban railway in equipment, distribution, purchasing, construction, traffic and transportation or other capacity requiring engineering ability. Over ten years' experience in railway and power manufacturing, installation, operating. Your proposition solicited. PW-651, Electrical Railway Journal, Old Colony Bldg., Chicago, Illinois.

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RAILWAY MOTORS

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0195

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Buffalo Housewrecking Co.
Buffalo, N. Y.

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First Class

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With angle Bars
Also other Weights. Immediate shipment.

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Cars, Locomotives, Piling, Tanks, etc.

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Cars Motors

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50—Controllers, K-28-B; K-12.
35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

It Pays to *Watch* This Page

EVERY ADVERTISEMENT on this page provides an opportunity for some owner to sell his machinery immediately. It will pay you to keep track of what other readers want.

If **you** need equipment and don't find it in the For Sale pages, put **your** card here. It will tell other readers what **you** want.

It Pays to *Use* This Page

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch
Stands
Ramapo Ajax Corp.
Automatic Safety Switch
Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Johnson & Co., J. R.
Standard Steel Works Co.
St. Louis Car Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Westinghouse E. & M. Co.
Axles, Steel
Carnegie Steel Co.
Babbitt Metal
Ajax Metal Co.
Badges and Buttons
Elec. Service Supplies Co.
Int. Register Co., The
Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.
Bearings, Center and Roller
Side
Stucki Co., A.
Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heat's Co.
Elec. Service Supplies Co.
St. Louis Car Co.
Western Electric Co.
Boilers
Babcock & Wilcox Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Electric Railway Impt. Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog
Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Railway Track-work Co.
Western Electric Co.
Bonds, Rail
Amer. Steel & Wire Co.
Electric Railway Impt. Co.
Elec. Service Supplies Co.
General Electric Co.
Indianapolis Switch & Frog
Co.
Ohio Brass Co.
Pare Steel & Wire Co.
Rail Welding & Bonding Co.
Railway Track-work Co.
Western Electric Co.
Westinghouse E. & M. Co.
Book Publishers
McGraw-Hill Book Co.
Brackets and Cross Arms
(See also Poles, Ties,
Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss
Co.
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Western Electric Co.
Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Brakes, Brake Systems and
Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Brooms, Track, Steel and
Rattan
Amer. Rattan & Reed Mfg.
Co.
Paxon Co., J. W.
Brushes, Carbon
General Electric Co.

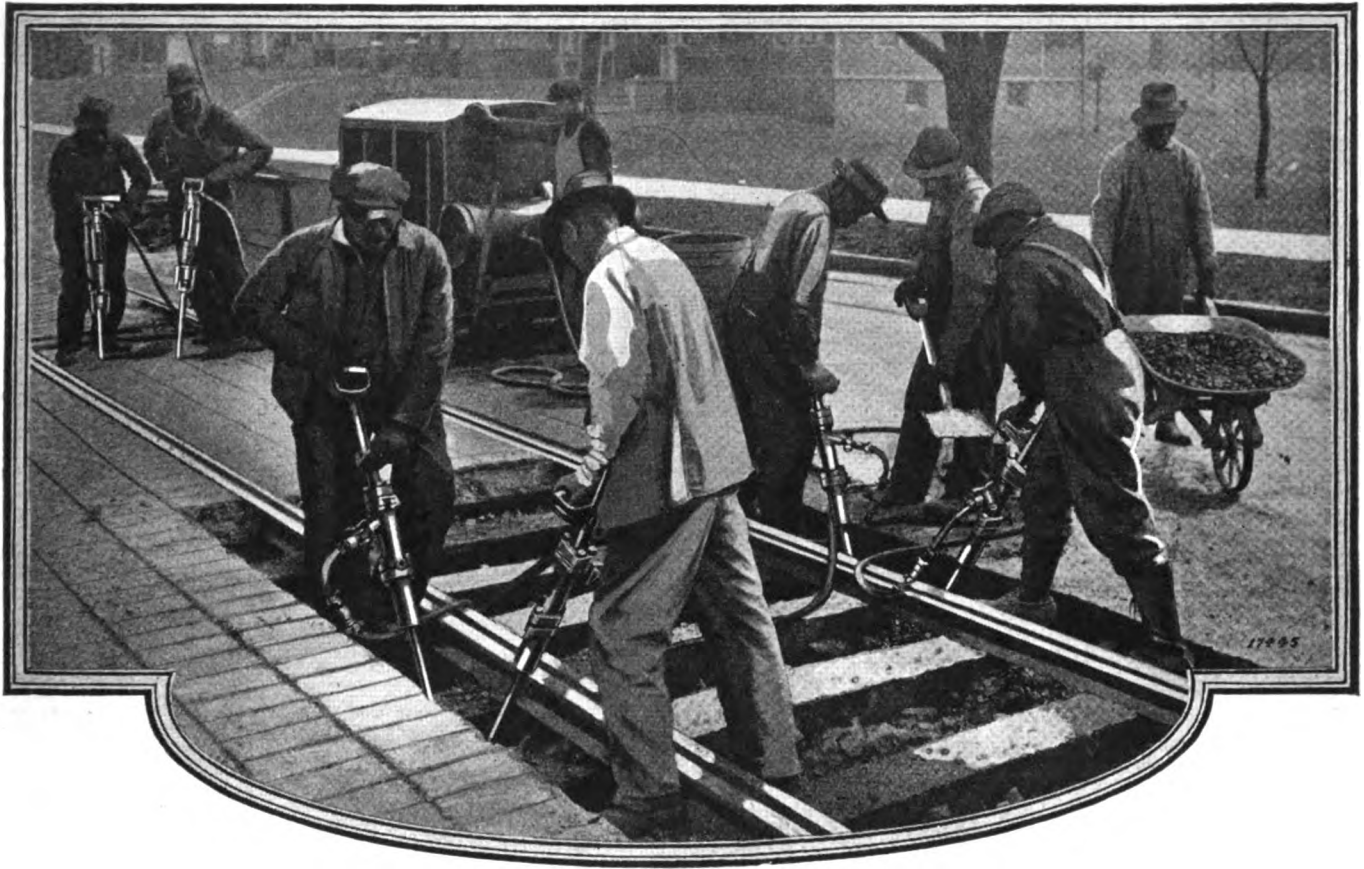
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Le Carbone Co.
Westinghouse E. & M. Co.
Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
Brush Holders
Anderson Mfg. Co., A. &
J. M.
Bunkers, Coal
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
Pierce-Arrow Co.
St. Louis Car Co.
Bus Seats
Hale-Kilburn Co.
Heywood-Wakefield Co.
Bushings, Case Hardened and
Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Cables, (See Wires and
Cables)
Camble Tapes, yellow and
black varnished
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Carbon Brushes (See Brushes,
Carbon)
Car Panel Safety Switches
Consolidated Car Heat's Co.
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.
Car Lighting Fixtures
Elec. Service Supplies Co.
Car Panel Safety Switches
Consolidated Car Heat's Co.
Westinghouse E. & M. Co.
Cars, Passenger, Freight, Ex-
press, etc.
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Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Watson Mfg. Co.
Cars, Gas, Rail
St. Louis Car Co.
Ribany Southern Railroad
Co.
Jones-McKee, Inc.
Carm, Self-Propelled
General Electric Co.
Car Signal System
Fahnestock Elect. Co.
Car Wheels, Rolled Steel
Bethlehem Steel Co.
Castings, Brass, Composition
or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. &
J. M.
Castings, Gray Iron and Steel
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Standard Steel Works Co.
St. Louis Car Co.
Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
St. Louis Car Co.
Catchers and Retrievers,
Trolley
Earl, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Western Electric Co.
Ceiling, Car
Pantastote Co., Inc.
Chance Carriers
Cleveland Fare Box Co.
Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.
Clamps and Connectors for
Wires and Cables
Anderson Mfg. Co., A. &
J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Scrapers, Track
(See also Snow-Plows,
Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.
Cloth, Stencil Silk Sign
Kress & Co.
Clusters and Sockets
General Electric Co.
Coal and Ash Handling (See
Conveying and Hoisting
Machinery)
Coal Handling and Winding
Machines
Elec. Service Supplies Co.

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Economy Elec. Devices Co.
Elliot-Thompson Elec. Co.
General Electric Co.
Westinghouse E. & M. Co.
Colls, Choke and Kieking
Elec. Service Supplies Co.
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Westinghouse E. & M. Co.
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Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.
Coin Sorting Machines
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Ingersoll-Rand Co.
Western Electric Co.
Westinghouse Tr. Br. Co.
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Ingersoll-Rand Co.
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Alphaduct Co.
Connectors, Solderless
Westinghouse E. & M. Co.
Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.
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General Electric Co.
Westinghouse E. & M. Co.
Controller Regulators
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Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
Conveying and Hoisting Ma-
chinery
Columbi M. W. & M. I. Co.
Copper Wire
Anaconda Copper Mining Co.
Page Steel & Wire Co.
Cord, Bell, Trolley, Register,
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Silver Lake Co.
Cord Connectors and Couplers
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Samson Cordage Works
Wood Co., Chas. N.
Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Cranes
Allis-Chalmers Mfg. Co.
Industrial Works
Universal Crane Co.
Cranes, Gas or Electric
Industrial Works
Universal Crane Co.
Cranes, Locomotive, Motor
Truck & Portable
Industrial Works
Universal Crane Co.
Cross Arms (See Brackets)
Crossing Foundations
International Steel Tie Co.
Crossings
Ramapo Ajax Corp.
Crossing Signals (See Sig-
nals, Crossing)
Crossing, Frog & Switch
Wharton, Jr. & Co., Wm.
Ramapo Ajax Corp.
Crossing Manganese
Bethlehem Steel Co.
Indianapolis Switch & Frog
Co.
Ramapo Ajax Corp.
Crossings, Track (See Track,
Special Work)

Crossings, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
Curtains and Curtain Fixtures
Brill Co., The J. G.
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Morton Mfg. Co.
Pantastote Co., Inc.
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Elec. Equipment Co.
B'klyn-Manhattan Transit
Corp.
Transit Equip. Co.
Zelnick Supply Co., W. A.
Derailing Devices (See also
Track Work)
Wharton, Jr. & Co., Wm.
Derailing Switches, Tee Rail
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Wish-Service, P. Edward
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St. Louis Car Co.
Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heat's Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
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Nat'l Pneumatic Co., Inc.
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Elec. Service Supplies Co.
Ears
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
Electrical Wires and Cables
Amer. Electrical Works
Roebling's Sons & Co., J. A.
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Railway Track-work Co.
Rail Welding & Bonding Co.
Seymour Rail Grinder Co.
Electrodes, Carbon
Indianapolis Switch & Frog
Co.
Railway Track-work Co.
Electrodes, Steel
Indianapolis Switch & Frog
Co.
Railway Track-work Co.
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tracting and Operating
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Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Laying Corp.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Richey, Albert S.
Sanderson & Porter
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Stone & Webster
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Worham, Edwin
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Fence Posts
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Consolidated Car Fender Co.
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Star Brass Works
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Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.
Frogs, Track (See Track
Work)
Frogs, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
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Wharton, Jr., Inc., & Co.
Wm.
Furnace, Electric
Pittsburgh Elec. Furnace
Corp.
Furniture, Metal Office
Edwards Co., Inc., O. M.
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General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
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General Electric Co.
Gaskets
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Westinghouse Tr. Br. Co.
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Westinghouse E. & M. Co.
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Goggles, Protector
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Co.
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Grinders, Portable
Euda Company
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Grinders, Portable Electric
Railway Track-work Co.
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Railway Track-work Co.
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Page Steel & Wire Co.
Guard Rail Clamps
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Guard Rails, Tee Rail &
Manganese
Ramapo Ajax Corp.
Guards, Cattle
American Bridge Co.
Guards, Trolley
Elec. Service Sup. Co.
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Central Equipment Co.
Harps, Trolley
Anderson Mfg. Co., A. &
J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.
Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Headlining
Pantastote Co., Inc.
Heaters, Car (Electric)
Consolidated Car Heat's Co.
Economy Elec. Devices Co.
Gold Car Heat & Light Co.
Nat'l Ry. Appliance Co., P.
Smith Heater Co., Peter

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77 Leading Electric Railways

Conserve Man Power and Reduce
Track Expense by using Pneumatic
Tie Tampers and Paving Breakers

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194-TT

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Smith Heater Co., Peter
- Helmet—Welding
Indianapolis Switch & Frog Co.
Railway Track-work Co.
- Holts & Lifts
Ford Chain Block & Mfg. Co.
Holts, Portable
Ingersoll-Rand Co.
- Hydraulic Machinery
Allis-Chalmers Mfg. Co.
- Indicating Signals
Oakel Equipment Co.
- Instruments Measuring, Test-
ing and Recording
Economy Elec. Devices Co.
Elec. Service Sup. Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Insulating Cloth, Paper and
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Mica Insulator Co.
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Okonite Co.
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- Insulating Varnishes
Irvington Varnish & Ins. Co.
- Insulation (See also Paints)
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Mica Insulator Co.
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Westinghouse E. & M. Co.
- Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.
- Insulators, High Voltage
Lapp Insulator Co., Inc.
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Symington Co., The T. H.
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(See also Headlights)
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Westinghouse E. & M. Co.
- Lamps, Signal and Marker
Nichols-Lintern Co.
- Lanterns, Classification
Nichols-Lintern Co.
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Elec. Service Sup. Co.
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Brackets, Insulators,
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Columbia M. W. & M. I. Co.
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Wharton Jr., & Co., Wm.
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St. Louis Car Co.
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Standard Oil Co. of (Ind.)
Universal Lubricating Co.
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Galena Signal Co.
Standard Oil Co. of Ind.
Universal Lubricating Co.
Machinery, Insulating
Amer. Insulating Mach. Co.
Manganese Steel Castings
Wharton, Jr., & Co., Wm.
Manganese Steel Guard Rails
Ramapo Ajax Corp.
Manganese Steel Switches
Frogs & Crossings
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Manganese Steel Special
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Allis-Chalmers Mfg. Co.
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Motor)
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General Electric Co.
Motormen's Seats
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Omnibuses (See Buses,
Motor)
Oxy-Acetylene (See Cutting
Apparatus Oxy-Acetylene)
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Power Specialty Co.
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De Vilbiss Mfg. Co.
Paint Spraying Devices
De Vilbiss Mfg. Co.
Paints and Varnishes (Insu-
lating)
Mica Insulator Co.
Mitchel-Rand Mfg. Co.
Paints and Varnishes for
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Pavement Breakers
Ingersoll-Rand Co.
Paving Brick, Vitrified
Nat'l Paving Brick Mfrs.
Assn.
Paving Guards, Steel
Godwin Co., Inc., W. S.
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Pinion Pullers
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.
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and Iron
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Westinghouse Tr. Brake Co.
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Pliers, Rubber Insulated
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Pneumatic Tools
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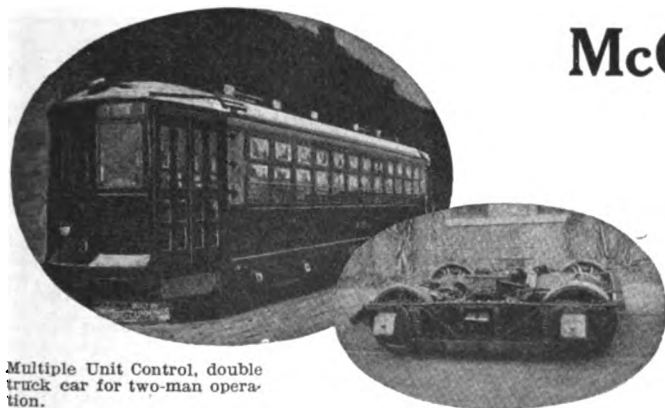
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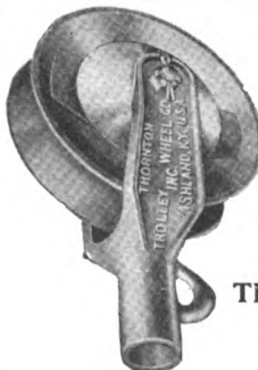
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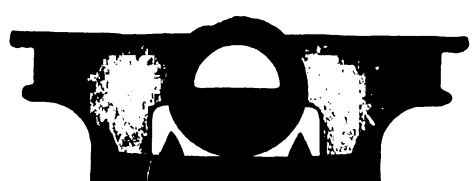
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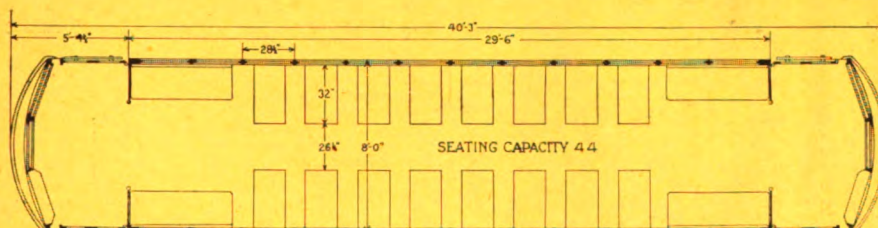
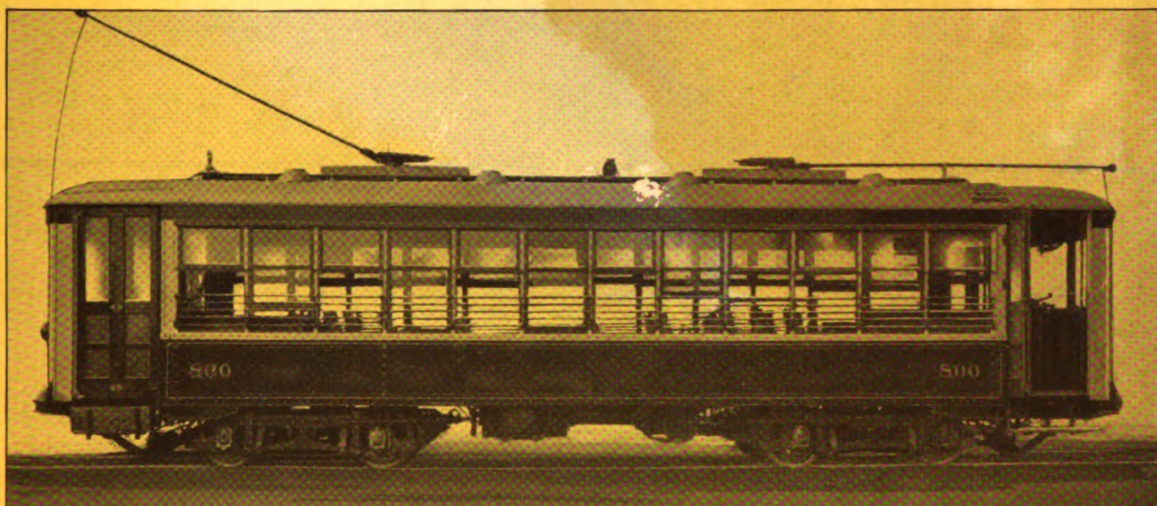
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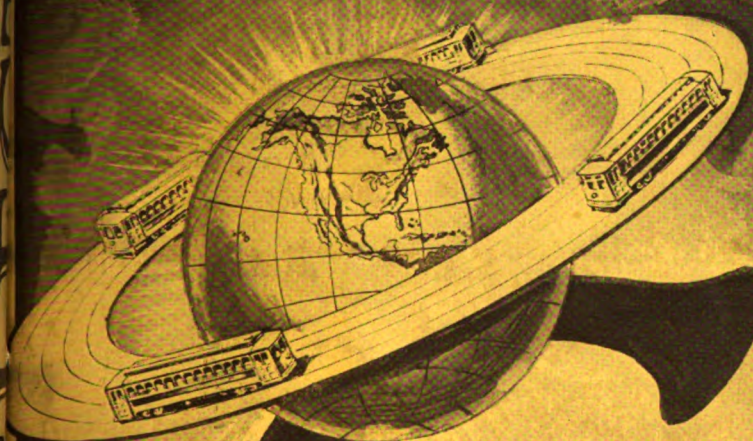
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ELECTRIC RAILWAY JOURNAL

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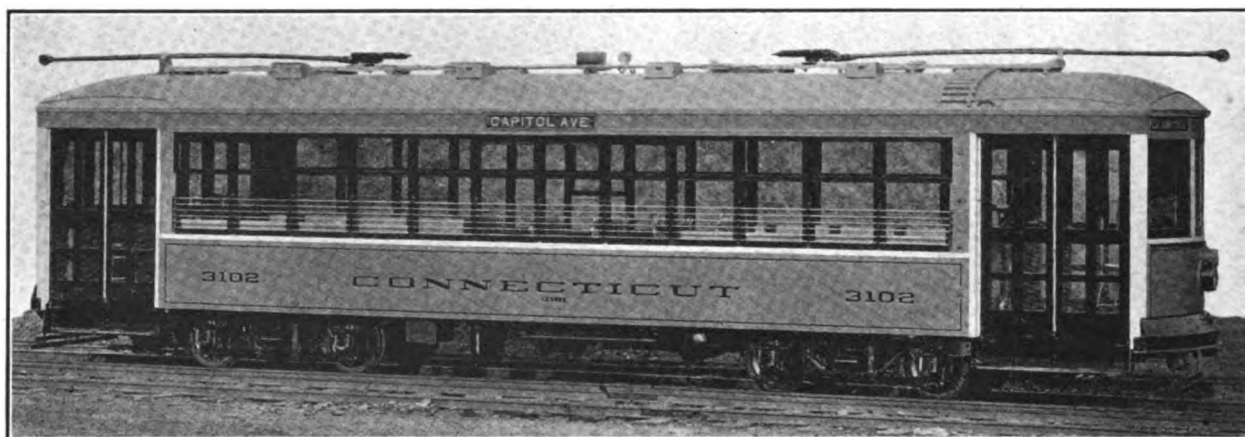
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"Literary Fellows"

DURING a friendly discussion between a railway executive and a member of the editorial staff of the JOURNAL concerning publicity work, the executive said: "We think that our publicity is pretty good, although maybe not so fancy as you literary fellows would write it."

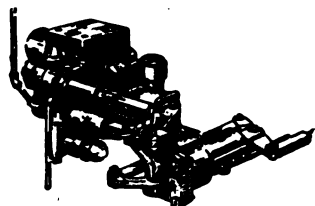
Right there is a point for comment. In the first place, the editors of the ELECTRIC RAILWAY JOURNAL are not primarily "literary fellows" at all, but railway men. Every one of the full-time editors has had practical railway operating experience. In the second place, the JOURNAL lays no claim to "fancy" writing—avoids it, in fact. Our constant endeavor is in exactly the opposite direction. To tell the story simply, clearly, practically and in the least number of words—that is our aim.

As railway men ourselves, we want the JOURNAL to be a practical help for other railway men rather than merely nice reading. Furthermore, we are writing the JOURNAL articles for railway men, not as publicity material for the general public, though the paper is frequently quoted in the public press. This, however, is no doubt for the purpose of reflecting to the public the views of railway men. In other words, the JOURNAL is not a publicity instrumentality, but a practical tool for helping active railway men to do their jobs better.



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Hear Mr. Walker

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The equipment that helped accomplish this result includes

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- 24 Universal Grinders
- 10 Reciprocating Grinders.

“As a result, riding has become more comfortable, noise has been eliminated, the expense of car maintenance has been reduced, as well as that of track maintenance, and derailments, particularly those due to the defective track, have become infrequent.”

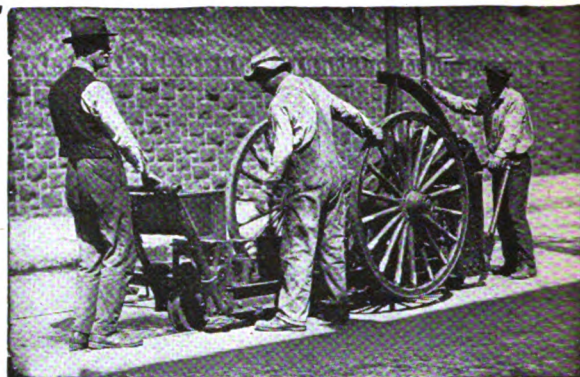
Can you too point to such achievements? The equipment shown at the right would help you as it helped Mr. Walker. Bulletins on request.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

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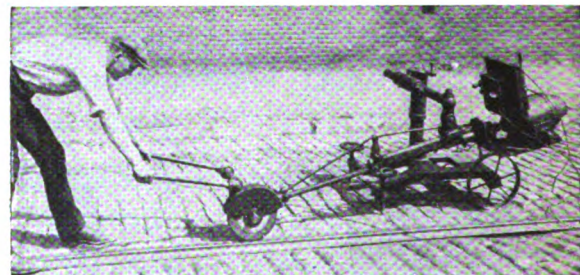
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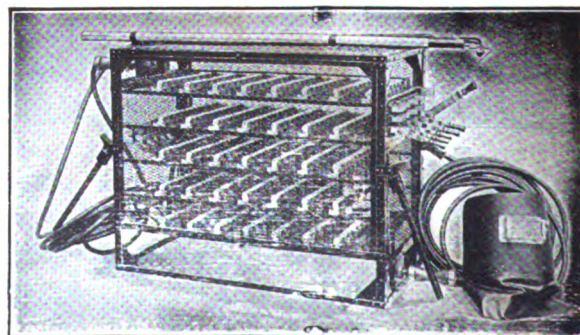
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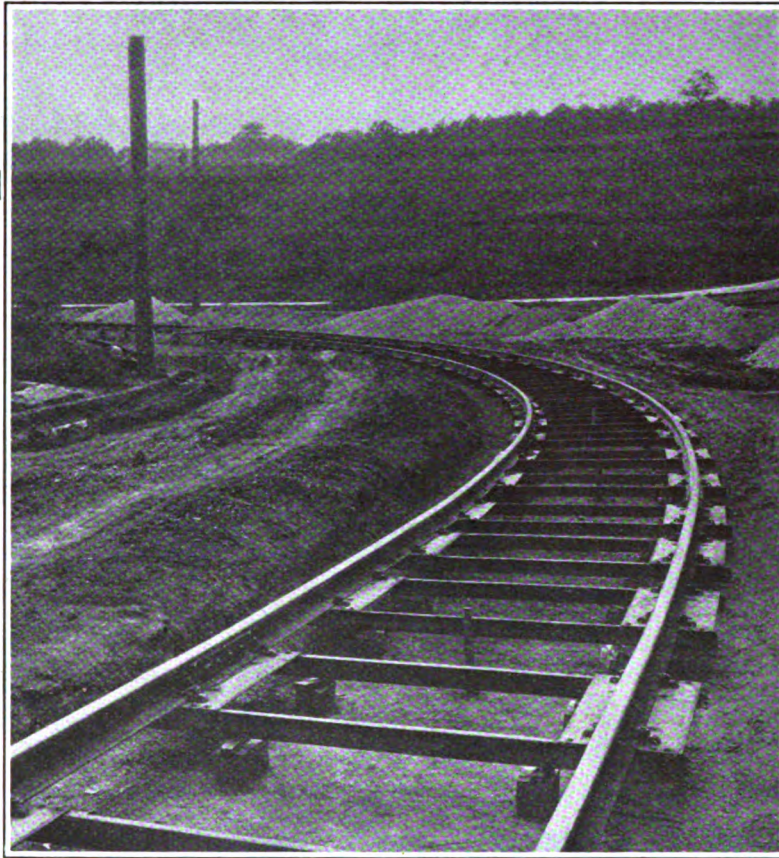


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LAY TWIN TIES IN CONCRETE FOR LONG-LIFE TRACK

THE unquestioned durability of steel and concrete are economically and correctly adapted to paved track work by Steel Twin Tie designs.

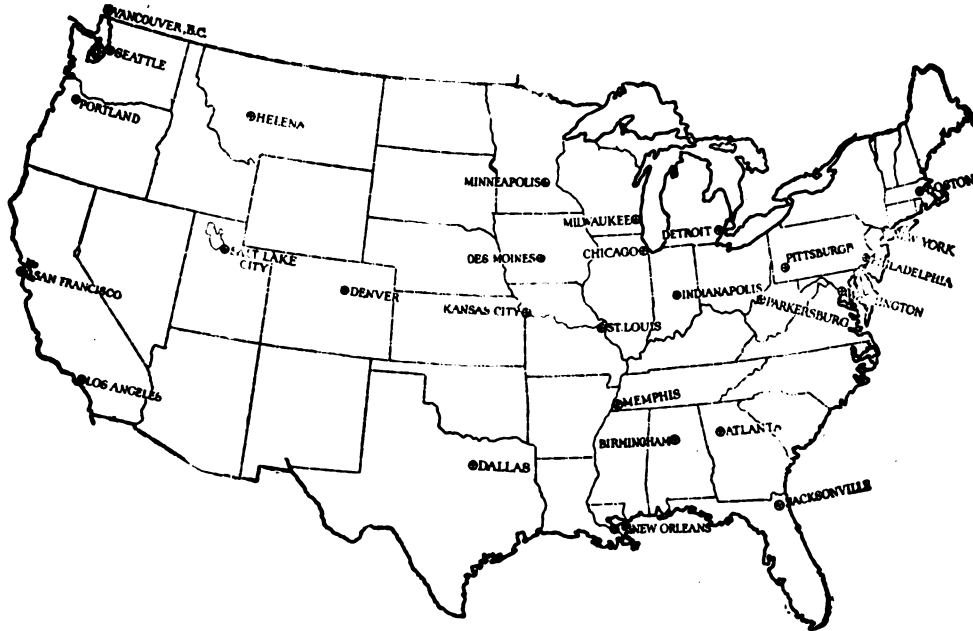
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Steel Twin Tie Track



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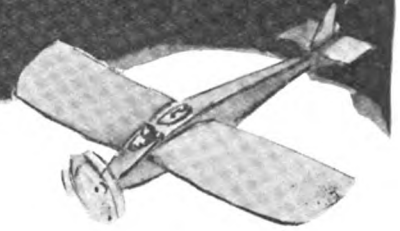
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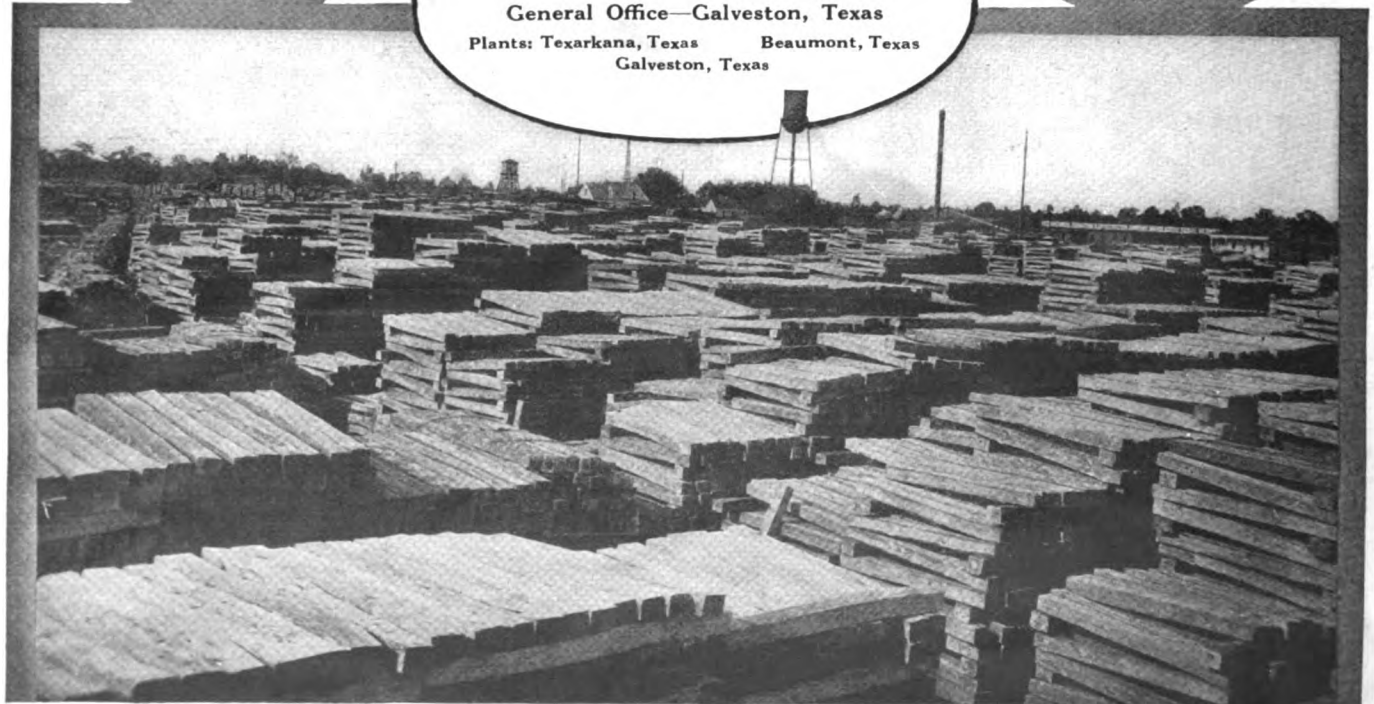
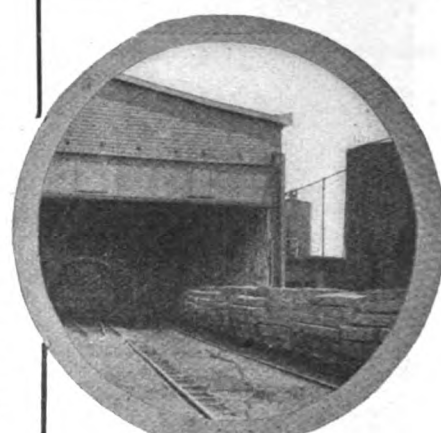
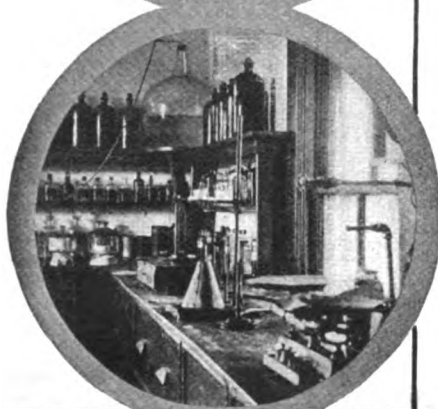
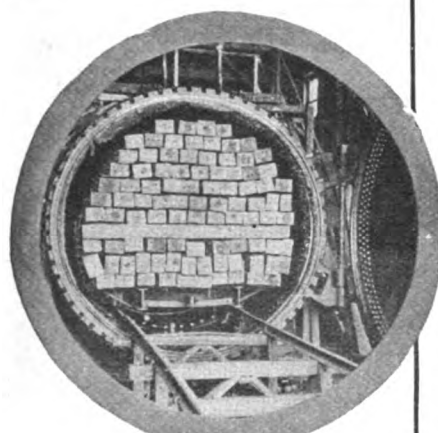
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pneumatic operation
of doors and steps
on railway cars***

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Maintenance Up-to-date

FOR generations the ELECTRIC RAILWAY JOURNAL'S Annual Maintenance Number has been the medium upon which an entire industry has depended for the gathering and summing up of the latest and best in all phases of equipping and maintaining the electric transportation services.

1924 conditions call for a bigger, better, stronger Maintenance Issue than ever before, and the ELECTRIC RAILWAY JOURNAL organization is pre-

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And its advertising pages will display the leading devices, the tools, the equipment, the materials and the supplies with the sales messages of their manufacturers, at the psychological moment for maximum effect on the readers who buy.

The Annual Maintenance Number March 22, 1924

We will be glad to prepare effective advertising copy (no charge for this service) if you send your reservation now. Write or wire and tell us what space to reserve.

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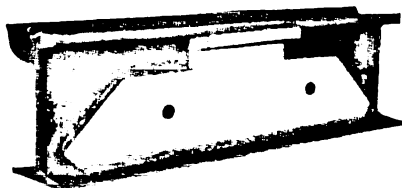
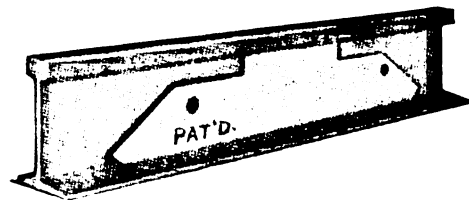
ELECTRIC RAILWAY JOURNAL, 10th Avenue at 36th Street, New York

Member A B C, A B P, A E R A

Report of Investigation of
“INDIANAPOLIS”
 Type of Welded Rail Joints
They Meet All Requirements

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4. **Dependable**—Less than 1% Failure. When installed as directed by manufacturer.
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6. **Available**—Any road. Any quantity —from One (1) to Ten Thousand (10,000).
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8. **Endorsed**—In use on over 200 properties.



WHY?

Because —

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“CONTINUOUS RAIL”

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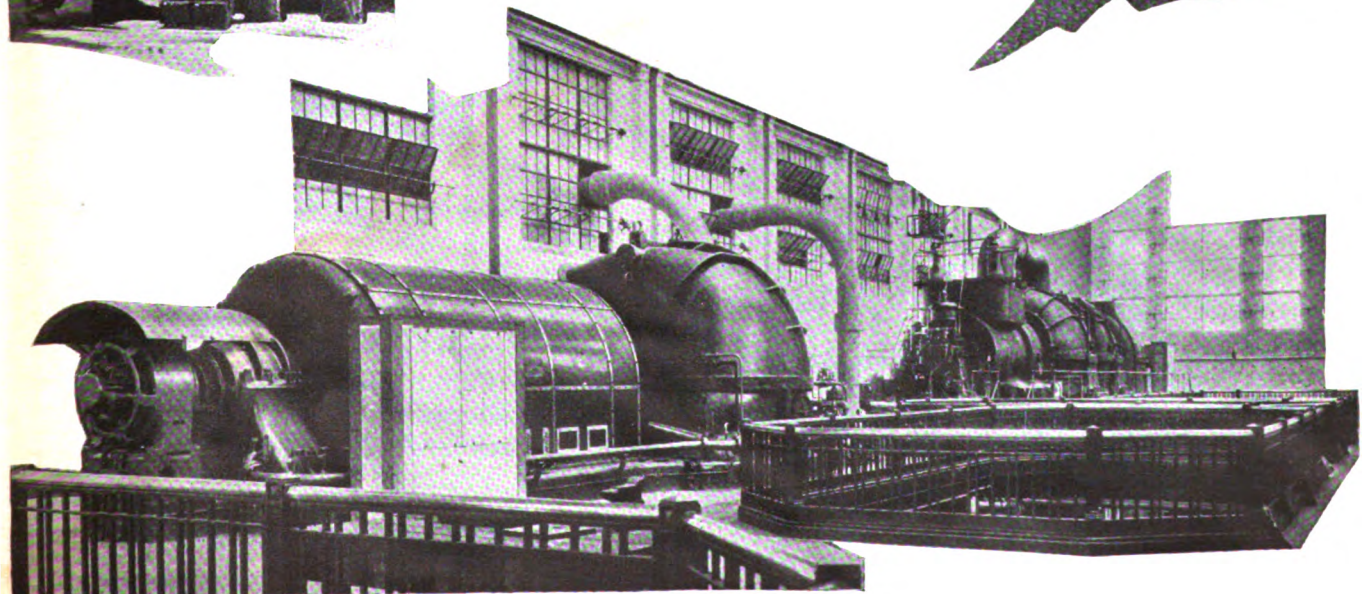
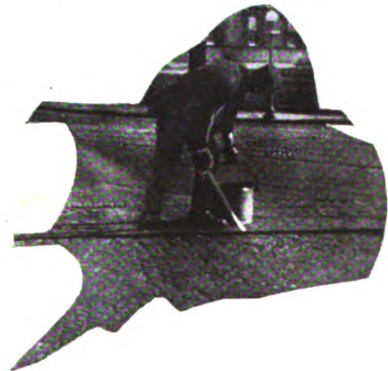
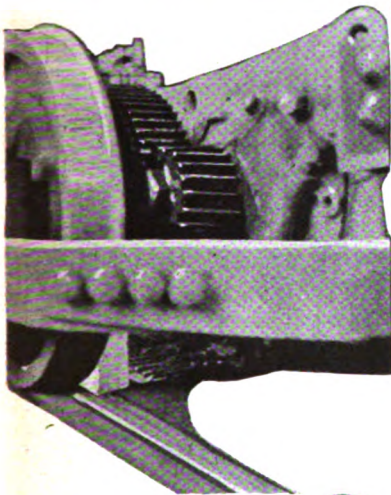
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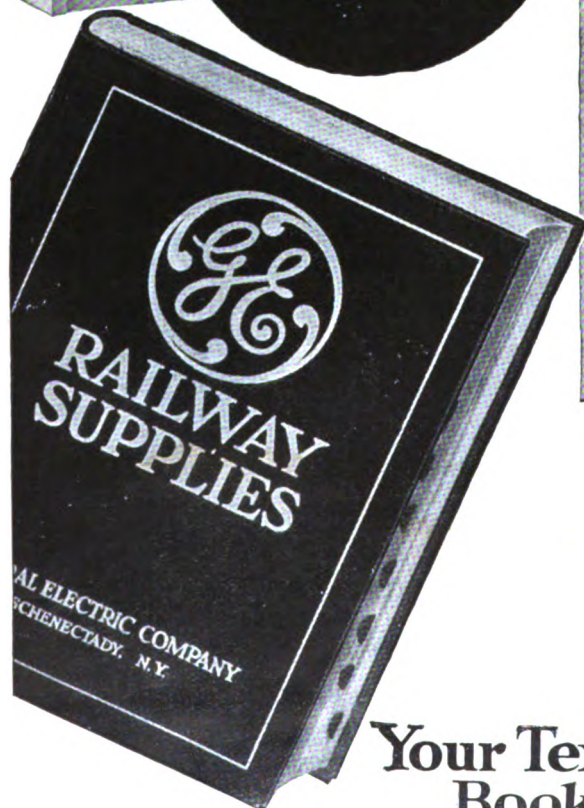
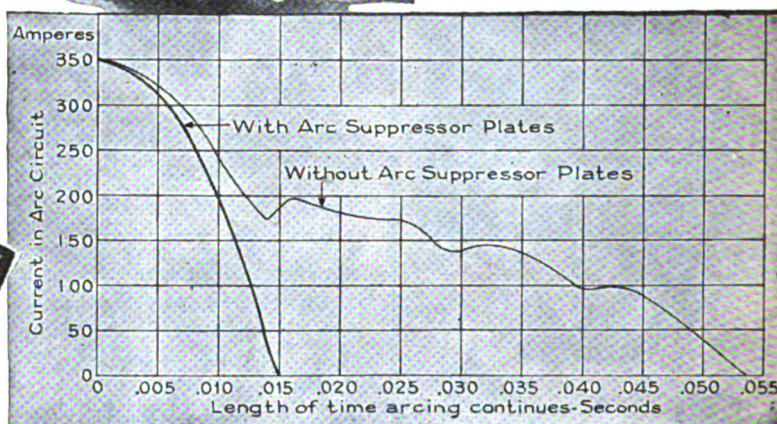
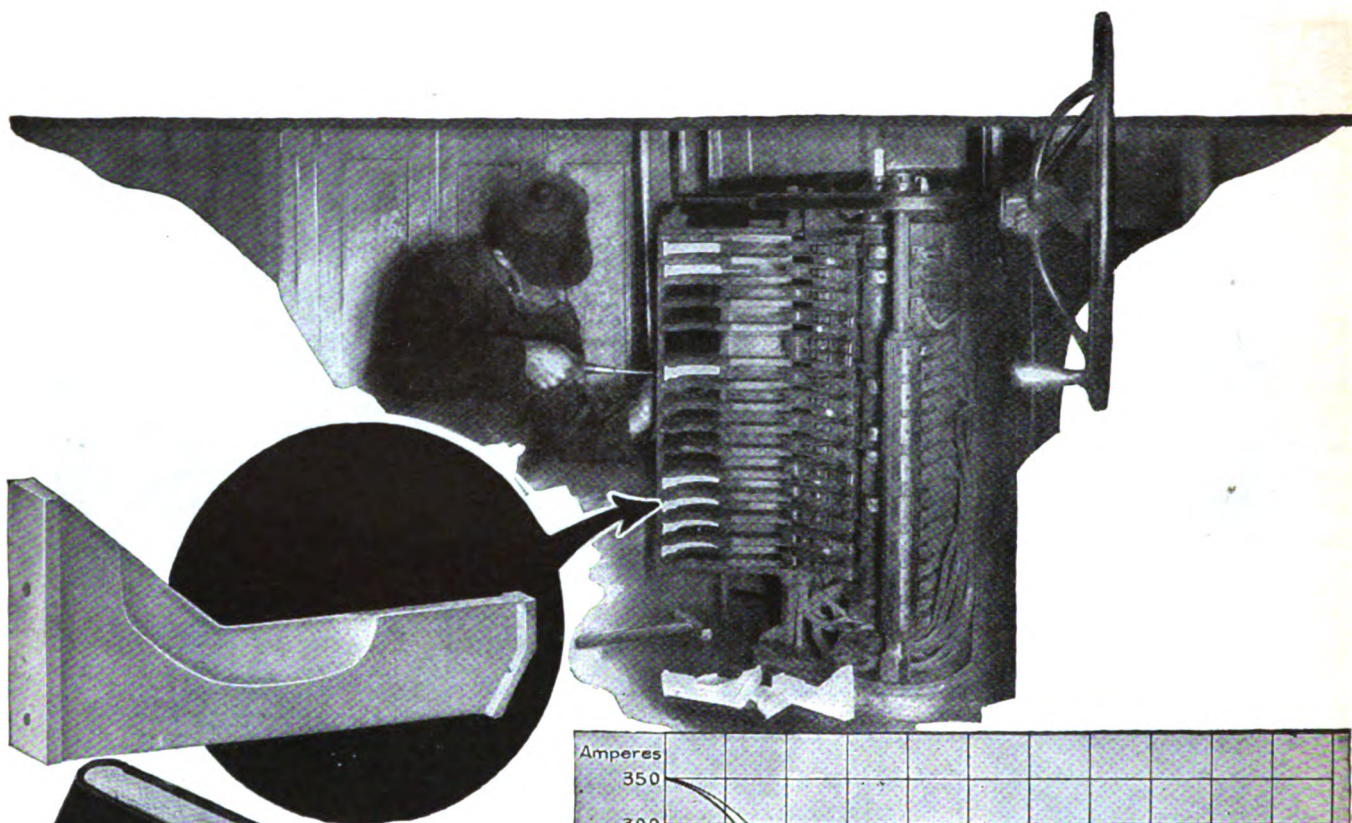
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Hundreds of Electric railroads are using Galena lubrication with matchless results in efficiency and economy. A request for our proposition will receive immediate attention.

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**Your Text
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on
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Notice the Difference

These curves show the difference in time required to disrupt the arc in a K-35 Controller when equipped with G-E Arc Suppressor Plates. They are plotted from actual oscillograph test data.

G-E Arc Suppressor Plates reduce carbonization and eliminate much trouble from pitting of contacts. All new Controllers with individual finger blowouts are equipped with them.

It will pay you to put them in your old Controllers. The plates are inexpensive, and easy to install. Try them.

On page 149 of your G-E Catalog is the list of G-E Controllers for which Arc Suppressor Plates are available, stating the number required and fingers to be protected.

GENERAL ELECTRIC

New York, February 23, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 63
Number 8

Last Call for

St. Louis Midyear

THE St. Louis Midyear Meeting of the American Electric Railway Association on March 4 bids fair to be an exceptionally worth-while gathering. If one can judge by the work and planning of the St. Louis committeemen in preparation for the event, it is going to be one of the best the association has held.

A large attendance is also in prospect, judging by the unusually large number of advance reservations for hotel rooms and dinner places. One reason for this is that the program offers real compensation for the trip to the convention city. Traffic congestion, one of the most serious problems confronting the railway operating man, is to be given consideration throughout the whole morning session. The afternoon session will be devoted to another matter in which the electric railways have a keen interest—finance. The speakers at these sessions and for the evening banquet are men whose messages will undoubtedly give us food for further reflection.

Altogether, this last call to the meeting should induce you now to make your reservations—hotel, dinner, railroad—taking advantage of the reduced rate of fare available by use of certificates distributed by Secretary J. W. Welsh, 8 West Fortieth Street, New York City.

Physical Property Shows

Progress in St. Louis

THAT much progress has been made in the rehabilitation of the property of the United Railways of St. Louis is indicated by the several articles which have appeared in this paper describing new work of the company. In this issue are articles describing new cars, track, and provisions for economical power supply. An article was published last week on the new automatic substations. An article published Sept. 1, 1923, told how substantial saving was being made in energy consumption through the installation of power-saving devices, and another article, on the new carhouse and storage yard at Broadway and Taylor Avenues, was published in the issue of April 14, 1923. The substance of these articles shows that, apart from the work done by the receiver in readjusting the finances of the company, a great deal has been accomplished along the line of placing the physical property in such shape that it can function efficiently and give real service to the public. These articles are also mentioned here to suggest to delegates to the Midyear Meeting on March 4 the things which they will find especially worth looking up while in St. Louis.

A receivership usually is regarded as a very serious undertaking that may spell the ruin of a road. While this may be true in some instances, where the property has inherent possibilities there may actually be an advantage. The receivers are unhampered by the ordinary obligations to capital, so that money that would go for interest and dividends can be applied to deferred

maintenance and construction that for the good of the property should have been taken care of in the past. A wisely administered receivership, then, may be of advantage in making the property good enough that it may ultimately become a real asset to the security holders instead of the liability it must have been at the time of failure.

It has not been a simple task for the receiver, but the physical property speaks for itself, and it is understood the financial difficulties are on the road to a settlement.

It will be interesting to note the further steps in the reorganization of the St. Louis property, and see what the advantage is in having a receiver who has the courage to spend money in order to put the property in condition to save money and operate profitably in the future.

Exhibits, a Barometer of Business

THE American Electric Railway Association will decide at the Midyear Meeting at St. Louis the question of whether there shall be exhibits and the time and place of the next annual convention. A few of the leading manufacturers have been canvassed for their views on this subject, and the majority favor having the exhibits as usual, and at Atlantic City.

No one doubts that an exhibit is about the most economical method for the manufacturer to present his latest developments in equipment to a large number of railway operators. Furthermore, an exhibit is a very effective kind of sales activity. For the electric railway operator, it provides an impetus to keep abreast of the times.

Exhibits in this and all other industries have not been held in years of business depression, but not to hold the annual exhibit in a year of good business is to admit the industry is standing still. The improved financial condition of electric railways negatives such a suggestion. The record of actual sales of manufacturers in 1923 shows an exceptionally good year. The association's exhibit last year exceeded all previous records with a registration of 4,400 and exhibit space of more than 76,000 sq.ft. sold—15,000 more than at any previous exhibition. When no exhibit was held in 1921, the attendance fell to 1,500.

This year the electric light, power and gas industries and the car builders for the steam railroads will hold their usual exhibits.

The electric railways have a quarter of a billion dollars to spend for improvements during 1924. Surely the manufacturers can ill afford to omit the exhibit.

Can any one imagine the motor vehicle industry giving up the national automobile show?

Never was there greater encouragement or opportunity for equipment development work, for the rail-

ways are earnestly seeking means of providing better transportation. Hence the progressive manufacturer will be working this year strenuously on new ideas and will need the exhibit to give first showing to his new products, as well as to display his older products—which are always new to many of the delegates who have seen the thing advertised but have not seen it first hand.

Furthermore, while a convention at Atlantic City lends itself exceptionally well to an exhibit, it is desirable now and then to hold the annual meeting at some other city, perhaps where facilities are too limited to undertake an exhibit. This may be the case in 1925.

Increasing Substation Capacity by Changing Units Has Advantages

A FEATURE of more than passing interest incorporated in the design of the St. Louis automatic substations described in the Feb. 16 issue of this paper is the arrangement for increasing the capacity of a station, not by the insertion of additional machines, but by the substitution of a larger unit in place of the one installed. The former method, which is the customary one, carries with it the necessity for anticipating, perhaps long in advance, the growth of traffic and consequent increase of load. This calls for a more expensive building, and possibly extra real estate. Although the space is provided for in the design, still there is a very considerable expense when it becomes necessary to install an additional unit, as the switchboard and all other auxiliaries must be changed accordingly.

With the St. Louis plan an increase in station load requires that the converter and its transformers must be removed and new equipment of increased rating substituted. Since modern machinery is practically always handled by means of remote control, the larger current does not necessarily demand a new switchboard, but only the substitution of necessary switches of correct rating. Such changes should be easier to make, and be less expensive, than the anticipation and installation of an additional unit.

Apart from the saving in idle investment prior to the increase in station capacity, there is the advantage that a new unit can be installed in place of a smaller one whenever the load exceeds but slightly the rating of one machine. This permits the use of machinery of such size that it approximates the daily loads much more closely than when the rating must be doubled at one operation. Of course, it is entirely possible to have units of different sizes in a manual station to approximate the demand. However, the most recent automatic substations with more than a single unit have duplicate converters so that they may be started interchangeably, thus increasing the reliability of the automatic control.

As a matter of fact, improvements in design have made it possible in the past for machines of double rating, or even larger, to be installed on the same foundations as the original machines. If the same progress can be anticipated in the future, there should be plenty of margin for growth in the system without the installation of additional units.

The major objection to the plan is that machinery must be removed from the station when its rating is increased. On a small property this would be a serious defect, but on a system as large as the United Railways, there will practically always be an opportunity to locate and use the smaller unit to advantage.

New Orleans

Does the Wise Thing

NEW ORLEANS has again acted wisely. For a time, however, it appeared that much of the good work done more than a year ago in reaching a settlement of the utility problem there would be negated by the refusal of certain members of the Commission Council to align themselves on the side of progress for the city. The story of the negotiations looking toward supplying the capital requirements of the New Orleans Public Service, Inc., as the local utility is known, has been told in the news pages as it unfolded itself.

First there was a dispute between the company and the city over the question of whether the average rate base for the year should be \$52,924,928 as claimed by the company or \$52,144,463 as claimed by the city. Thus there was a difference of \$779,864. There was room for honest difference of opinion in regard to the disposition of most of the items, but in the aggregate these items were not important enough to affect rates except ever so slightly even if all of them were allowed to the company.

This question, however, paled before the more important one of providing the funds necessary for extensions and improvements. The return permitted to the company on the rate base is $7\frac{1}{2}$ per cent. Bonds of the company secured by mortgage have been selling at rates which still reflect the uncertainties of the past, one issue to net more than 8 per cent and another more than 9 per cent. Financing by means of bonds, accordingly, was out of the question.

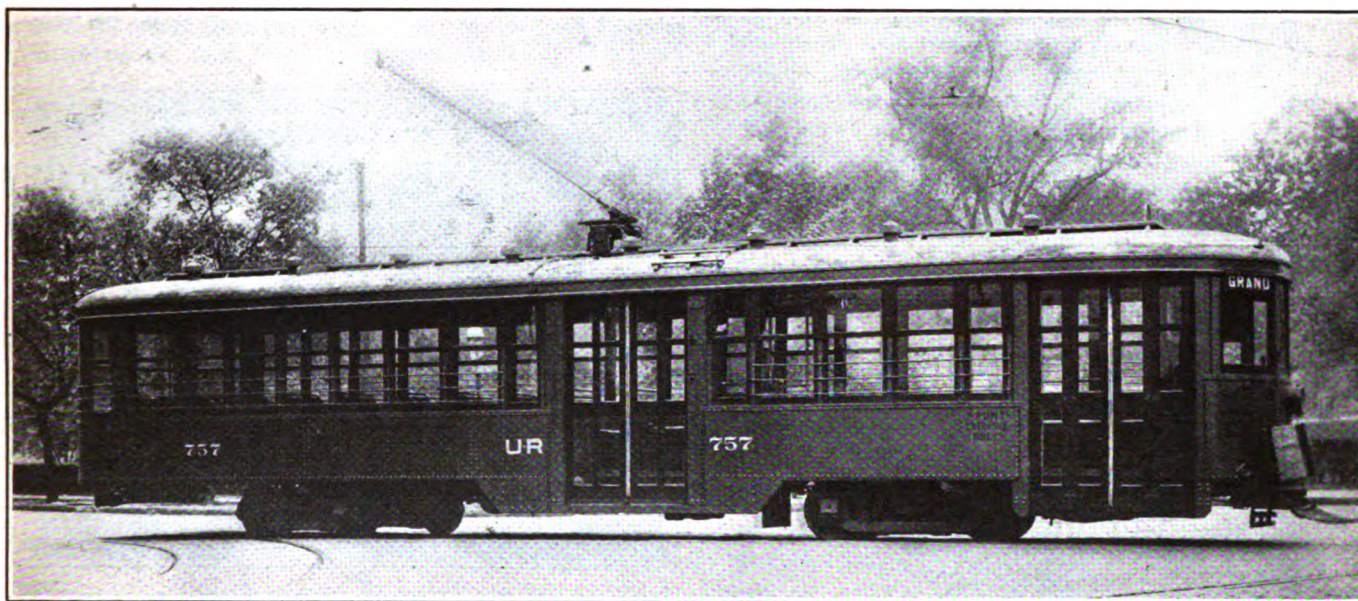
But the need of New Orleans was immediate. The Electric Bond & Share Company, owning the common stock, stood ready to purchase \$7,500,000 of additional common stock at par to pay a 9 per cent return if earned. This, of course, looked big to some of the representatives of the city. After all, however, the return fixed for the whole property on the rate base is $7\frac{1}{2}$ per cent, so that in the light of the risk taken by the holder of the common stock the rate of dividend was not incommensurate.

The financial set-up at New Orleans following the reorganization was \$42,000,000 of bonds and only \$12,000,000 of preferred and common stock. As a matter of fact, on the average rate base of \$52,939,371 for the year ended Sept. 30, 1923, the company earned a balance of only \$1,325,896 available for sinking fund requirements, dividends and surplus reserves, or 6.61 per cent on the rate base. Thus the Electric Bond & Share stood ready to stake millions of dollars on the prospects of the future. Yet it took a long while to win the members of the Commission Council over. But now that it has been done, the prospects are that affairs affecting the utilities in New Orleans will proceed along lines that will quickly result in all the advantages that follow when a public utility is so strengthened in its financial position that it can function financially and physically to the best advantage.

SOME most interesting papers and discussion on means to relieve traffic congestion and speed up local transportation were heard at Chicago before the Western Society of Engineers on Feb. 6 and 7. They are published in this issue and that of Feb. 9. They will be of special interest to electric railway men just now in view of the session to be devoted to the same subject at the St. Louis Midyear Meeting of the A.E.R.A.

St. Louis Front-Entrance, Side-Exit Cars

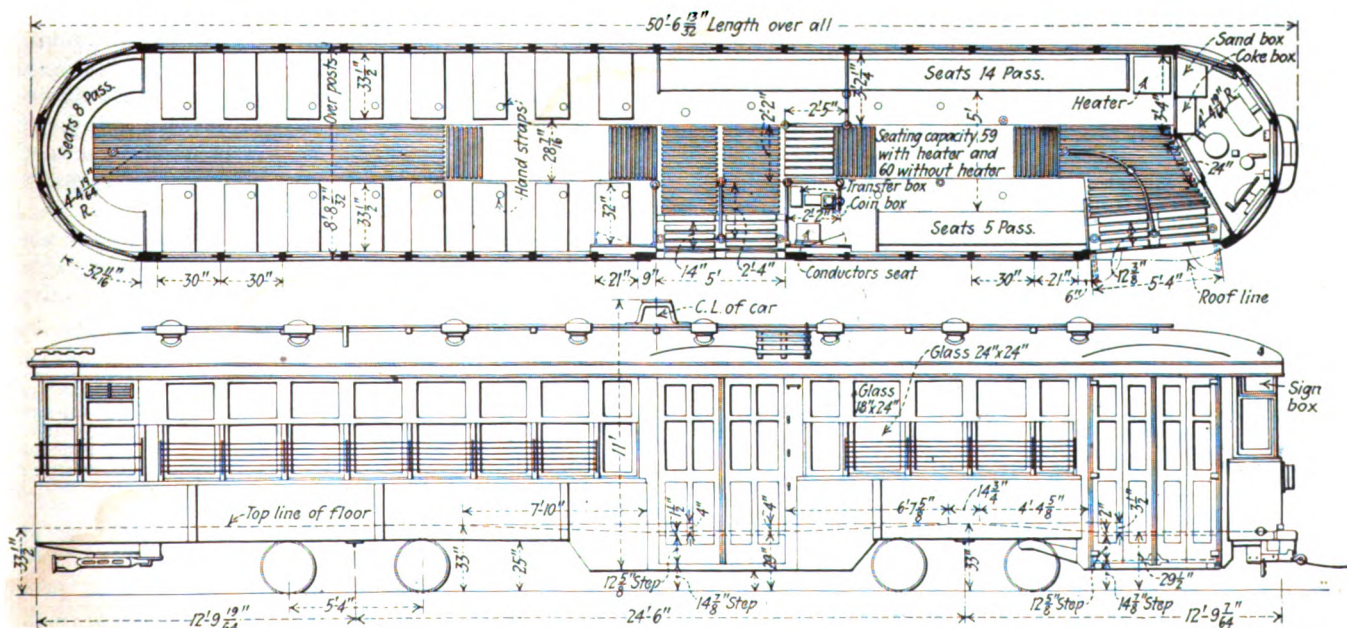
Fifty Cars Now Building Will Make Total of 201 of This Type Which Have Been Placed in Service Since 1920—Standard Design Retained Is Featured by Ramps in Floor, Inside Steps, Separate Motorman's Compartment and Aluminum Rails and Stanchions



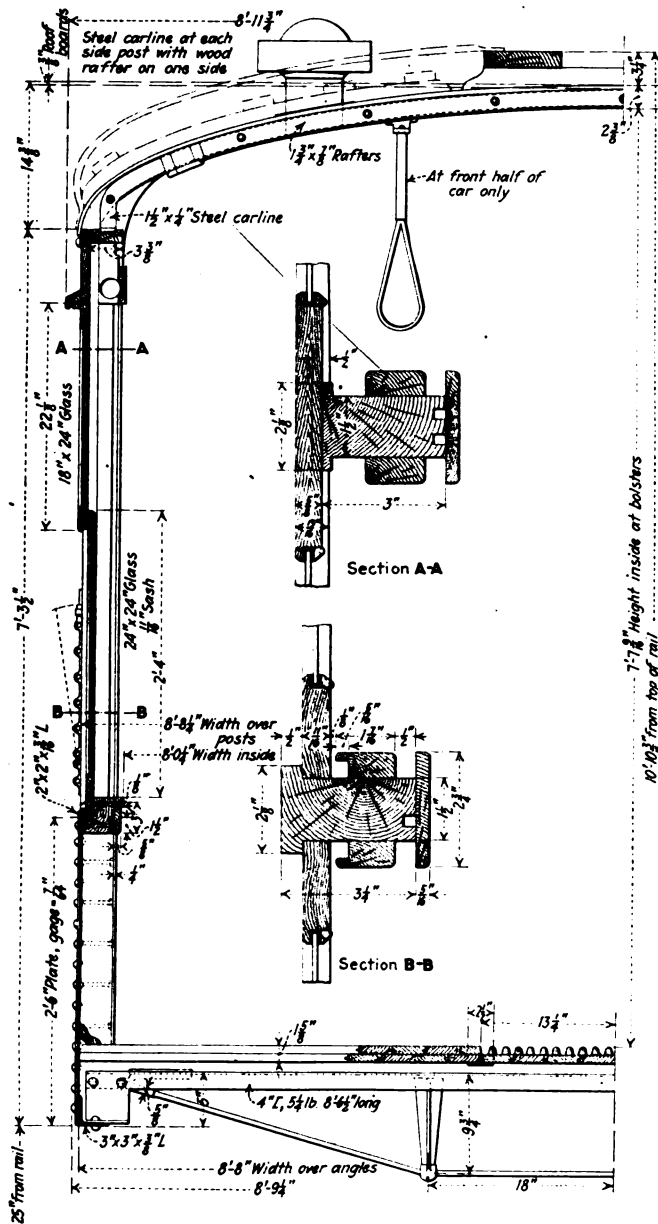
Fifty Motor Cars of This Type Are in Process of Construction for Use on United Railways of St. Louis

A GROUP of fifty front-entrance, side-exit motor cars now being constructed in the shop of the United Railways of St. Louis, under the direction of M. O'Brien, master mechanic, will give this property a total of 201 cars of this type in service when the present lot is completed. The design has been maintained standard for each group, and the new lot is therefore almost an exact duplicate of the first group, which was described briefly in *ELECTRIC RAILWAY JOURNAL*, Sept. 18, 1920, page 551. One important change has been made from the first lot of these cars, in that the more recent cars have been equipped with four 35-hp. motors whereas the first group had four 25-hp. motors.

One of the features of interest is the use of ramps at both the front end and the center section to eliminate drop platforms and folding steps, and at the same time to make possible the use of a single 12½-in. inside step, both at the center and at the front doorway. To accomplish this with 26-in. diameter wheels the floor of the car is carried as low as possible, a clearance of 3 in. being allowed for the light car body between the floor and the wheel flange. Additional clearance is obtained by having the bottom of the floor at the front end cut out in an arc corresponding to the wheel swing, so as to prevent the wheels from rubbing against the under side of the floor when the truck parts become worn. The



Low Step Heights Are Obtained by the Method of Ramping the Floor Arrangement of Floor Strips in Aisle Is Shown in Plan



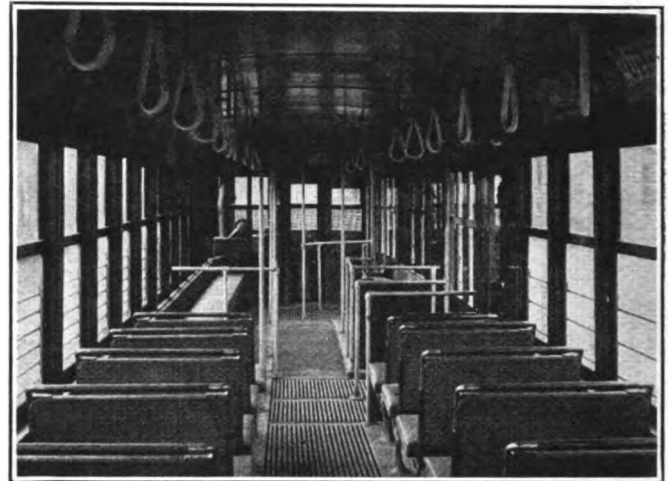
Steel Side Girder Framing and Wood Side Posts Are Used. Cross Sill Channels Are Installed with Web Horizontal to Give Additional Clearance

truck springs are designed so that they will go solid with a total deflection of 3 in., but normally will not reach this deflection with a maximum passenger load on the car.

All rails and stanchions used in the interior of the car are made of 1-in. aluminum pipe. To assist standing passengers, stanchions have been liberally provided in the front longitudinal section of the car and at the entrance and exit doors. In addition to the rail surrounding the conductor's position, a second rail has been installed on the opposite side of the car, extending out

from the longitudinal seat, so as to produce in effect a narrow aisle immediately opposite the conductor. This is to facilitate the collection of fares when the car is crowded. The arrangement of these rails and stanchions is clearly illustrated in an accompanying photograph.

A step height of 14½ in. from the rail to the inside step is obtained, with an additional rise of 12½ in. from this step to the car floor. The heights are the same at both the front and center door openings. From the edge of the step to the edge of the body aisle the floor ramps 1½ in. at the center door and 2 in. at the front.



Floor Ramps and Aluminum Railings Feature the Interior. Note Motorman's Compartment at the Front End

The top of the floor at the bolster is 33 in. above the rail. To reach this point, a longitudinal ramp of 4 in. in 6 ft. 7½ in. is provided from the center, and a similar ramp of 3½ in. in 4 ft. 4½ in. is put in at the front. The aisle is arranged with floor strips extending across the direction of movement, to prevent passengers from slipping. In addition the edges of the floor and steps are protected by Feralun step treads.

The cars are arranged for single-end operation. The motorman is provided with a compartment built into the front end of the body. In addition to the control apparatus, this compartment contains boxes for sand and coke. A Peter Smith hot air heater is located in the front corner of the car body, immediately back of the motorman's compartment partition.

The exit is placed immediately forward of the middle of the car. The door operating equipment is National Pneumatic and the cars are also provided with interlocking control, to prevent starting before all doors are closed. The conductor's station is at the forward side of the opening. He is provided with a transfer box, coin tray and fare box.

Designed for duty on heavy city lines, the cars are 50 ft. 6½ in. long over all. They have a maximum width of 8 ft. 11½ in. and are 10 ft. 10½ in. high over trolley

GENERAL SPECIFICATIONS OF NEW ST. LOUIS MOTOR CARS

Length over all	50 ft. 6 13/32 in.	Control	K-35 G. R. 2	Step treads	Feralun
Width over all	8 ft. 11 3/4 in.	Line switch	Westinghouse 801-E	Sanders	Nichols-Lintern
Height over trolley boards	10 ft. 10 3/16 in.	Door operating mechanism	National	Registers	Security
Side post centers	30 in.		Pneumatic safety interlocking	Hand brakes	Peacock
Side sash glass	24 in. x 24 in.	Interior trim	Cherry	Trolley catchers	Ohio Brass
Truck centers	24 ft. 6 in.	Headlining	Agasote	Trolley base	Ohio Brass Form No. 1
Wheel base of trucks	5 ft. 4 in.	Sash fixtures	O. M. Edwards		
Gage	4 ft. 10 in.	Curtain fixtures	Curtain Supply Co.		
Wheel diameter	26 in.		ring 88		
Type of truck	Commonwealth cast steel frame, built by railway	Curtain material	Pantasote	SUMMARY OF WEIGHTS	
Motors	Four Westinghouse 510-A	Destination signs	Hunter	Two trucks complete less motors	10,414 lb.
Air brake	Westinghouse SM-3 with DH-16 compressor	Buzzers	Consolidated	Four motors	5,900 lb.
Journals	3-3/4 in. x 7 in.	Fare boxes	Johnson	Body complete with control and air brake equipment	23,086 lb.
		Heaters	Peter Smith hot air	Total	39,400 lb.
		Headlights	Ohio Brass		

boards. Longitudinal seats are used in the front section and cross seats in the rear. The operation is on the pay-as-you-pass principle. The total seating capacity is fifty-nine passengers in winter and sixty in summer, when the heater is removed. Cross seats are spaced on 30-in. centers, which corresponds with the spacing of the side posts. The design gives an interior width of 8 ft. 1½ in. over the side post pilasters. Using a 33½-in. cross seat cushion, an aisle width of 28½ in. is obtained.

Straight side girder construction with wood side posts is used. The girder sheets are ¾-in. material reinforced with 3-in. x 3-in. x ⅝-in. lower side-sill angles and 2-in. x 2-in. x ⅝-in. angles at the belt rails. The horizontal flange of the latter is bent up at an angle of 24 deg. so as to provide for drainage.

Ash side posts of 3¼-in. x 1½-in. section are fastened to the side girders by through bolts. The lower sash are of wood and are arranged to raise, while the upper

sash, also of wood, are framed in continuous lengths and fastened permanently to the outside of the side posts. Tenoned across the tops of the side posts are wood top plates, and 1½-in. x 7½-in. wood letter boards complete the side frame construction.

Flat steel carlins of ¼-in. x ¼-in. material are bolted to 1½-in. x ¾-in. ash carlins and are set on the top plate at each side post, to form the arch roof framing. The roof is covered with ¾-in. tongued and grooved poplar.

To obtain maximum clearance under the floor for brake rigging and other apparatus, the body cross sills, which are made of 4-in., 5½-lb. channel, are set on the flat instead of on edge. Round steel truss-rods on these cross sills are made of ½-in. material and are supported on malleable iron struts, 9½ in. long. The floor is of double thickness, 1½-in. material. Yellow pine is used for the under floor and on the sides, but in the aisle the top layer is replaced by maple strips.

How Shall We Solve Traffic Problems?

How This Work Is Being Organized in Some Cities and Some of the Results—Why a Broader Viewpoint Is Necessary—The Traffic and Transportation Plan Should Be Made for a City Double the Present Size—Greatest Need Is Leadership, and Railways Should Supply It

By J. Rowland Bibbins

Consulting Engineer, Washington, D. C.

IN A PREVIOUS article in the *ELECTRIC RAILWAY JOURNAL* for Nov. 10, 1923, some elements of the traffic problem, with which every large city and traction company is confronted, were analyzed and discussed as to the broader features. Now it seems desirable to inquire whether this vastly important matter is being handled adequately, what results are being secured, also to consider whether more effective and far-sighted methods and organization are not needed.

Traffic and transportation have assumed a new significance and importance within the last decade, for they now involve things outside the operation of the railway. In fact, the operating integrity of every large railway system is coming to be not a matter of how to run street cars better, but how to run them at all. The study of traffic today is not simply one of parking signs and police regulation, as most people think, but is one which should cover the following main elements:

1. Street and highway plan, for present and future.
2. Transit service—capacity and routing.
3. Traffic organization and control, vehicle and pedestrian.
4. Railroad terminal operations; marine, in port cities.
5. Relation to the broad city plan and general public welfare.

To illustrate, most railway men conceive the private automobile as the principal offender in traffic congestion. But in a recent traffic survey the writer found that commercial vehicle traffic averaged about one-half of the total automotive traffic in the downtown district of a large city and held practically constant throughout non-rush hours—a condition which is clearly brought about in this city by the extremely defective thoroughfare plan. Railroads have continued to concentrate their local traffic close into the business district, which results in cluttering up the streets with crosstown freight movement. Few industries have taken steps

toward efficient cartage control with definite routing for their trucks and delivery vehicles, such as that established some years ago by the Denver Tramway Company, in connection with its construction work. In port cities marine trucking traffic to industries and freight stations may also be found using passenger streets quite unnecessarily. Another source of congestion is that many commercial houses use the sidewalk and street for loading and are thus quite inconsiderate of the need for full street capacity.

EXAMPLES OF HOW PROBLEM IS BEING ATTACKED

How is the problem being studied? Three cases will illustrate.

1. In Baltimore, a traffic committee appointed by the Mayor has just reported after six months labor.* The report covers numerous detailed recommendations mostly pertaining to the central district. It gives little or no consideration of the proper relation of the central district to the entire city and the further development of local transportation to meet future needs. But it does lay great stress upon railroad grade separation throughout the city, citing seventy-seven locations for examination. All existing traffic regulations are proposed to be abolished and the entire matter put into the hands of the police commissioner without technical supervision or advice of any kind. And the far greater problem of an adequate transportation plan seems not to be comprehended in the report.

2. In Washington, the United States Senate committee of the District of Columbia, after long hearings, has finally reported to Congress. This report goes much further. While urgent recommendations are largely confined to disciplinary measures to secure quick relief, the report does recommend "a thoroughgoing engineer-

*This report was reviewed in *ELECTRIC RAILWAY JOURNAL*, Feb. 9, 1924, page 232.

ing survey" of local transportation and development covering:

Determination of conditions and facts from detailed traffic surveys.

Relative value of present streets and facilities.

Future trends and needs of Washington.

Means of simplifying street car routing and operation, and increasing loading speed.

Approximate cost of improvements and means of financing.

3. Indianapolis has perhaps visualized this program most concretely under the auspices of the City Plan Commission. Zoning is an accomplished fact in this city. The commission next turns to the transportation plan, broadly conceived, the first step of which is the development of a city-wide, comprehensive traffic thoroughfare system. These thoroughfares are being classified and designed for auto speedways, boulevards, local and rapid transit streets and heavy traffic streets, with particular reference to the by-passing of traffic foreign to the central business district.

The next step will be to develop traffic organization and control involving the usual multitude of details, particularly to afford relief to the central district.

The third step will seek improved rail routing and operation, particularly in the congested district, but also as it affects the entire transit system. This involves to some extent both previous steps, with these objects:

To untangle downtown traffic and railway looping by decreasing both car and vehicle interference so as to release traffic capacity.

To increase speed of transit through, and loading speed within, the terminal district.

To increase the facility of through movement and decrease necessity of transferring as far as possible.

To secure a better passenger distribution and pick-up throughout the business district.

To provide traffic capacity for inevitable future growth of the transit system, at the same time making a provision for the adoption of the motor bus when and where practicable.

The fourth step involves railroad terminals, line and grade separations, as all these factors involve city development, continuity of main thoroughfares and the relief of traffic and transit obstructions, now so serious. The sequence of these railroad developments is particularly important, and the location of new lines so as best to round out the city in residential settlement.

Other investigations are continually being reported by automobile clubs, electric railways, chambers of commerce, newspapers, civic clubs and the interminable sporadic efforts of local improvement associations. Most of these efforts are voluntary or directed toward the protection of definite interests.

Only in Boston, with its forty-two surrounding communities, has a well-conceived transportation plan been put under way. This is adequate in scope but unfortunately hampered by limited working funds. Chicago, Pittsburgh, St. Louis and Los Angeles have approached the problem in parts at different times.

What the situation needs is leadership. And the railway industry, with its personnel most skilled of any of these groups in the art of transportation, seems best qualified to and should take and hold leadership with courage and perseverance. It should assume a positive rather than a negative attitude; i.e., what to do rather than what not to do. To put the programme concretely:

1. Organize co-operatively adequate technical and

factual surveys of local conditions, traffic movement, and the needs of present relief and future development whether by rail, bus, rapid transit or steam suburban service. The financial support for such work should not be niggardly, but commensurate to its vital importance to the industry.

2. Develop a comprehensive traffic and transportation plan based upon this factual survey which shall furnish the authorities and people with a guide to reasonable future action and development. Minor details of traffic control are entirely subordinate in first importance.

3. Organize a competent local civilian advisory body to consider this plan, subject it to constructive criticism and to furnish the powerful support which such a body can give. This is its proper function.

4. Spread broadcast by every educational means properly available the theory, purpose and advantages of the transportation plan so that the authorities may be better qualified in their official actions to express more directly the enlightened opinion of the community.

5. Start now to carry out the plan as fast as conditions warrant.

Some detailed problems have received practically no study. Yet they are of the greatest importance. Many of these so-called traffic problems are subject to the same analysis as street railway and railroad operation. For example:

Efficiency of the police traffic signals and effect on track capacity, headway and routing.

Proper relation of signal duration to traffic volume. Best type of signal for varying traffic conditions—fixed, flexible, block signal.

Best means of segregating traffic, horizontally and vertically.

Adequate relief of congested district from foreign traffic. Three-track express idea in traffic routing.

Determination of the average parking time demand for different classes of traffic and facilities needed for each.

Economic design of traffic roadways for their particular service.

Here are essentials for the future toward which every large railway system should be working:

Increase of 10 to 20 per cent in car schedule speed—imperative to meet private automobile competition.

Doubling the efficiency of use of roadways by traffic. It can be done now in many cases.

Large increase in efficiency of police signal control. This is the critical or key point of attack.

Development of cheap day storage by efficient alley-garages; municipal undertaking if necessary.

Development of limited-stop express service by car or bus to major outlying sub-centers whenever feasible.

Cartage control of commercial vehicles by business or industry operating them, especially routing.

Higher efficiency and control of off-track railroad freight movement, especially higher unit loads and routing.

Standardization of large vehicles to economize in the great cost of providing adequate roadways.

Development of the arcade plan of street widening, where full widening is not feasible.

More high-class railroading in traffic organization, movement and control.

Every city should be at work on its traffic and transportation plan. The more one studies these complex traffic operations, the more it becomes evident that one-sided or part solutions will be totally inadequate to secure lasting results even if temporary relief is secured. The scheme of organization proposed therein is simply in line with the modern tendency toward research. It embodies co-operative effort so essential in the final stage of the proceedings. We should plan now for a city of double the present size without stopping to quarrel at just what time this growth probably will be reached.

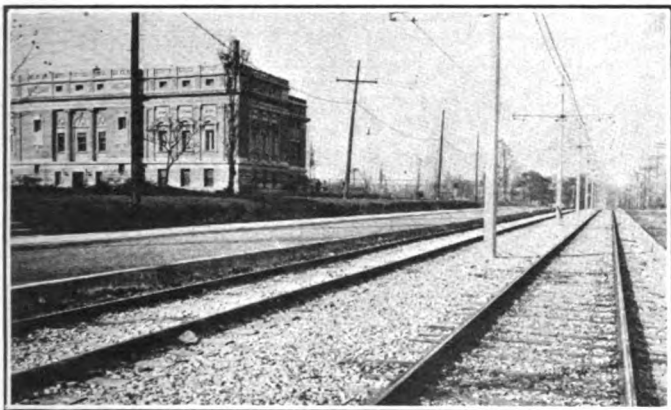
St. Louis Track Construction Includes Novel Features

Open Construction with T-Rail on Rock Ballast Is Used on Reservation or Private Right-of-Way in City Streets — Granite Flange Blocks Are Used with T-Rail in Paved Streets — Special Machinery Facilitates Construction Work

OF THE 518 miles of track of the United Railways of St. Louis, serving a population of 900,000 in the city of St. Louis and 100,000 in University City and St. Louis County, 144 miles are of the open T-rail ballasted type of construction. Approximately 17 miles of this track are located within the city and in incorporated suburban towns and are laid in reserved strips in the center or alongside of public streets. Adjoining large parks and cemeteries, these reserved strips are placed alongside of the paved roadway, while in other locations they are placed in the center of the street. This arrangement facilitates the movement of traffic by keeping the automobiles, etc., clear of the tracks. The crossings over the right-of-way are placed

Special deeds were prepared to transfer all property required for the 70-ft. street, and not yet dedicated to public use, to a trust company which held it in trust until the tracks were completed. Prior to the completion of the track, an agreement was entered into with each municipality through which the line ran to vacate the old streets upon the condition that the line was built and the new streets were dedicated. Upon completion of the track the trust company conveyed to the railway company its private right-of-way and then dedicated to public use the two 23-ft. streets on each side. Certain crossings were specified in the franchise ordinance passed by each city.

Since the completion of this line several of the streets



Concrete Center Pole Construction Is Used Extensively on Private Right-of-Way in St. Louis



Approximately 17 Miles of Track in City and Suburbs Are Laid in a Reserved Strip

at such intervals that the cars are permitted to operate at comparatively high speeds.

In some cases the city when improving the street has simply provided for pavement outside of the space occupied by the tracks and has permitted the company to occupy the reserved strip without any expressed franchise agreement. In such instances the railway, since it holds no title, is not required to pave the adjacent roadways. In other locations the company holds title to a private right-of-way in the center of a street and ownership obligates it to pay certain portions of the cost of paving the vehicular roadways. Such expense, however, is always considerably less than the cost of paving the space in which the tracks are located, so that the arrangement results in considerable economy.

An extension approximately 2 miles in length which was made some years ago into a comparatively well built up section west of the city furnishes an interesting example of the method used for acquiring a private right-of-way in a new district. The agreement to make the extension stipulated that the tracks were to be located in a 24-ft. private right-of-way between two 23-ft. streets, a total width of 70 ft. An existing street along the route varied in width from 50 ft. to 60 ft.

on each side of the tracks have been paved and the cost of the pavement of such streets has been considerably less than would have been the cost of paving the tracks had they been laid in a public street. These cities were of the third and fourth class and street pavements are paid for on the front-foot basis. The company, therefore, paid one-half the cost of improvement of roadways in each case.

Wydown Boulevard, in the city of Clayton, furnishes another interesting example of this type of construction. The tracks are located in a 30-ft. right-of-way on each side of which a 45-ft. street is built. A 5-ft. strip on each side of the right-of-way has been left after the subdivision and improved with grass and trees. The streets are well paved and are built up with very high grade residences, on land that sells for more than \$100 per foot.

A broad city planning idea has been generally accepted in St. Louis County. As a result the United Railways has received co-operation from the subdividers of lands along its county lines. In some cases the railway company has furnished tentative plans for the subdivision of a large number of tracts and has gone to considerable trouble to assist subdividers in order to



Rail Breaker Facilitates Track Reconstruction. The Wings on the Sides Shear Off Ties and Paving as the Rail Is Pulled Out

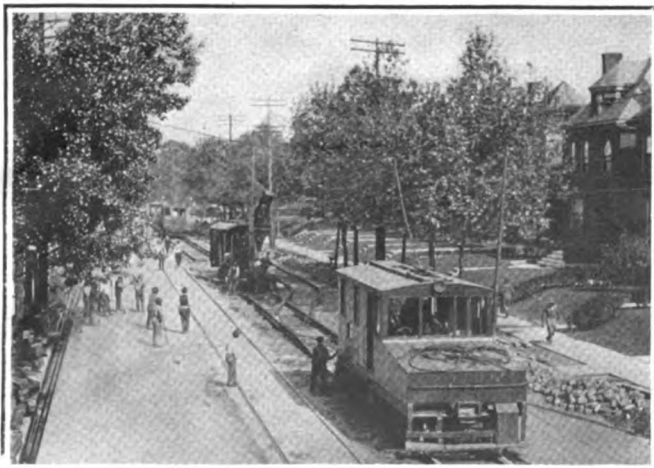
demonstrate that such land could be subdivided properly from a sales standpoint and at the same time leave satisfactory lines of communication across the tracks without an excessive number of crossings. After several years of such co-operation with land owners the engineers of the railway are generally consulted about proposed subdivisions and in almost all cases have been able to secure a great improvement in original plans.

TYPES OF TRACK CONSTRUCTION

Paved track in streets comprises a total of 338 miles and in addition there are 36 miles in carhouses and yards. Of this total 191 miles are laid with new modern rails on concrete foundations and paved with hard pavements, 85 miles are laid with obsolete types of side bearing girder rails on concrete foundations, 19 miles are obsolete types of side bearing girder rails on ballasted foundations and 45 miles are track special work.

The new rails used by the United Railways in paved streets are Lorain, 9-in., 132-lb., section 440; Lorain, 7-in., 103-lb. girder, section 426 or 478; Lorain, 7-in., 95-lb. T, section 400, and Lorain, 7-in., 91-lb. T, section 375. A large percentage of this T-rail replaced obsolete types of 7-in. girder rails which had been laid on concrete foundations. The 9-in. girder rail is used in the downtown district and the 7-in. is mostly in paved streets where there has been a large amount of vehicle traffic.

Six-inch, 100-lb. A.R.A. T-rail, series "A," which is used in 127 miles of track, is the standard type of rail in general use except in the downtown districts or where steel-tired vehicular traffic is heavy.



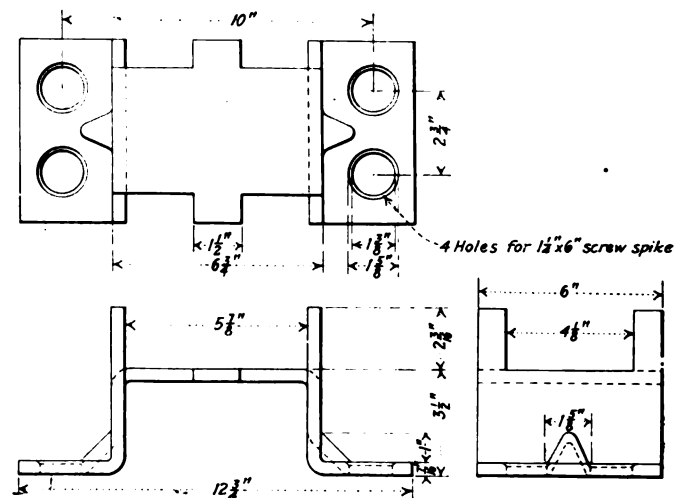
During Reconstruction Work, a Portable Siding for Work Cars Is Used and One Main Track Is Kept in Service

Most of the open track in private right-of-way is laid with 80-lb. T-rails on creosoted oak ties with gravel or broken stone ballast.

Where obsolete types of girder rails laid on concrete foundations are replaced with new rails the 100-lb. T-rail is used, and this rail is laid on a 3-in. forged steel chair manufactured with four lugs which bend down over the base of the rail to hold it in place. Tie rods are used on standard 6-ft. spacing to hold the rails to gage. Ties which are in bad condition in old concrete foundations, through decay or spike killing, are removed and replaced with steel ties of the M-25 Carnegie type. By using the steel tie in such work it has been found easy properly to surround the new tie with concrete.

The standard track foundation is at least 12½ in. thick, 6 in. of the material being under the ties. The concrete consists of a 1-3-6 mix. The ties are 6-in. x 8-in. x 7-ft. 4-in. hewn white oak, adzed and drilled for screw spikes in the material yard before delivery on the work.

On new foundations laid for 100-lb. T-rail tracks the Vaughn type of tie plate is used. This plate is made



Forged Steel Chair Used in St. Louis for Mounting 6-In. T-Rail on Old 9-In. Foundation

of soft steel ¾ in. x 7 in. x 10½ in., sheared so as to provide four lugs which can be bent down over the rail base. Screw spikes ¾ in. x 6 in., placed more than 1 in. away from the rail base, hold the plate firmly to the tie. No tie rods are used in such work.

All joints in T-rail tracks are made with rolled, ten-rivet, 32-in. Nichols joint plates, 1-in. rivets being placed with an 80-ton squeezer. Joint plates and rail ends are thoroughly sand blasted before the joints are made and the spaces under the rail head and around the rail base are filled with molten spelter.

Standard new 9-in. girder rail track construction is made up of a solid concrete foundation 15 in. thick with 6 in. of concrete under the ties, using the white oak ties already mentioned. Other details include ½-in. x 6-in. x 11-in. flat tie plates, malleable steel rail clips, ¾-in. x 6-in. screw spikes, sixteen-rivet, 32-in. forged Nichols joint plates and ¾-in. round tie rods with standard 6-ft. spacing.

SPECIAL WORK IS MANGANESE

Practically all of the special work used by the United Railways is of the solid manganese type. Standard switches have a 100-ft. inside radius and standard frogs are used as far as possible. Comparatively few triple frogs are in use and carhouse layouts are of a simple type, containing very few triple frogs or double

curve frogs. Switches and mates in carhouse special work are almost all open hearth material, with a 40-ft. inside radius. Spring switch locks are used on facing point switches in car yards and on main line tracks, but electric switches are used at the more important locations.

Nichols joint plates have been found to have an electrical efficiency considerably above that of the rail itself, and consequently no bonds are installed at these joints. Cross bonds between rails and between tracks are placed about 180 ft. apart or about every third rail.

Poles supporting trolley wires in streets are almost all placed along the curbs, very few being in the center of the street. Most of the metal poles used during recent years are the tubular steel or the "Bates" type. Reinforced concrete poles, 35 ft. long, have been used extensively on county lines or along private right-of-way. This type has been used for most of the center pole construction in open track.

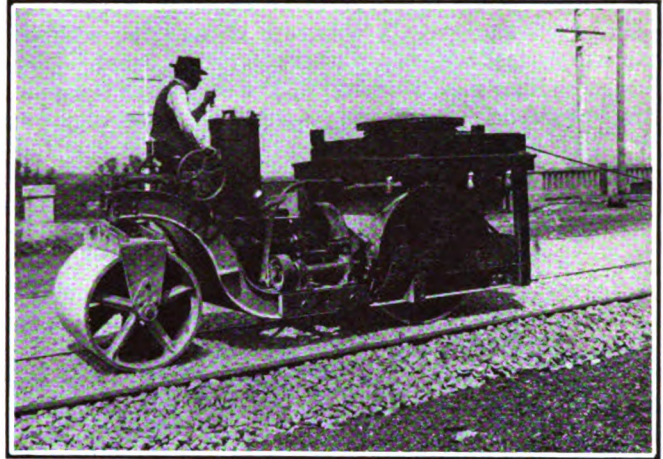
Track pavements during the past two years have been laid with new or redressed granite blocks of Missouri, Wisconsin or Carolina stone, but Missouri granite is being used almost exclusively for flange blocks in T-rail tracks. The street department of the city of St. Louis now insists upon the use of granite in track work, both for repairs, construction and reconstruction work. Paving blocks are generally laid on a sand cushion with a cement-sand grout filler, but in some cases the blocks have been laid on a cement-sand cushion with a cement-sand filler. For paving the 1-ft. space outside of the rails, special blocks 12 in. in length are purchased, and these blocks are laid on a cement-sand base and with a cement-sand filler.

TRACK CONSTRUCTION EQUIPMENT

The material handling equipment of the United Railways consists of twelve tool cars for division track foremen, approximately seventeen motor flat cars, nine motor trucks and seventeen trail flat cars. One Differential dump train, one Koppel dump train and four dump cars of the gondola type, three center dump ballast cars and two special dump trains complete the material handling equipment. The special dump trains consist of two-car units, each car containing eight dump boxes designed by the railway for distributing materials away from the track. The boxes dump over the sides of the cars in such a position that material is thrown almost completely clear of the track cut. The unit box arrangement has been found particularly satisfactory for distributing the proper proportions of sand and stone along the track for making concrete.

A rail breaking machine, two Thew shovels, one Clark pavement plow, air compressors and blasting cars make up the equipment for taking out old tracks. The Thew shovels unload directly into dirt trains which stand on a portable siding connected with a Kerwin crossover. This siding is dragged along the street by the work cars. It is of sufficient length to permit the dirt trains to serve the Thew shovel and at the same time permits the rail breaking machine to tear out the old tracks ahead of the shovels.

Old rail is removed with a rail breaking machine which consists of a two-drum 50-ton Clyde hoist, operating two rope cables each of 1½ in. diameter. The hoist is mounted in a car supported on a steam locomotive tender frame base. The front end of the machine is loaded down with ballast and at the rear end an "A"



An Electric Pavement Roller, Equipped with Cable Reel

frame controlled by air cylinder is mounted so that it can be made to bear on the rails. The heavy rope cables attached to rail tongs are brought down from sheaves on the top of the "A" frame to points on the rail about 7 ft. behind the car. The rail breaker tears up rails, tie rods, pavements and practically all ties in ballasted tracks. In concrete tracks, however, only those ties which are larger at the top than at the bottom are pulled out.

The concrete mixers in use are the Drake type fed by long chain conveyors. It is the experience of the United Railways that careful gaging of the materials placed alongside the tracks for concreting will insure a satisfactory quality, and the cost of handling is much lower than with other types of machines.

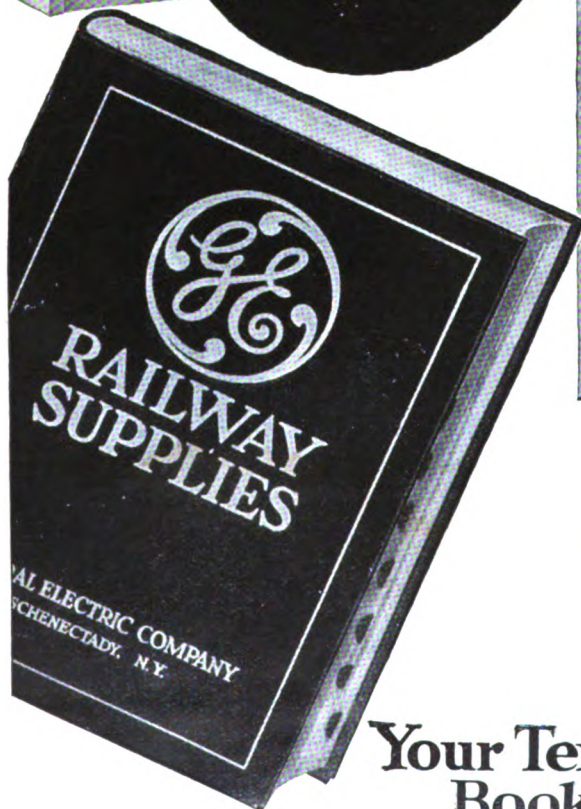
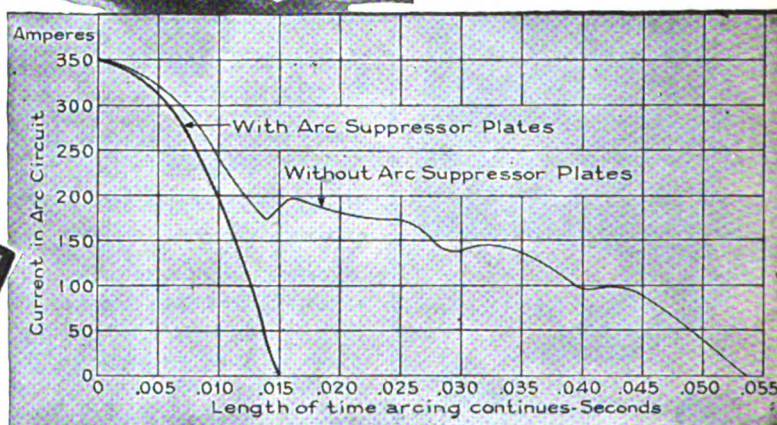
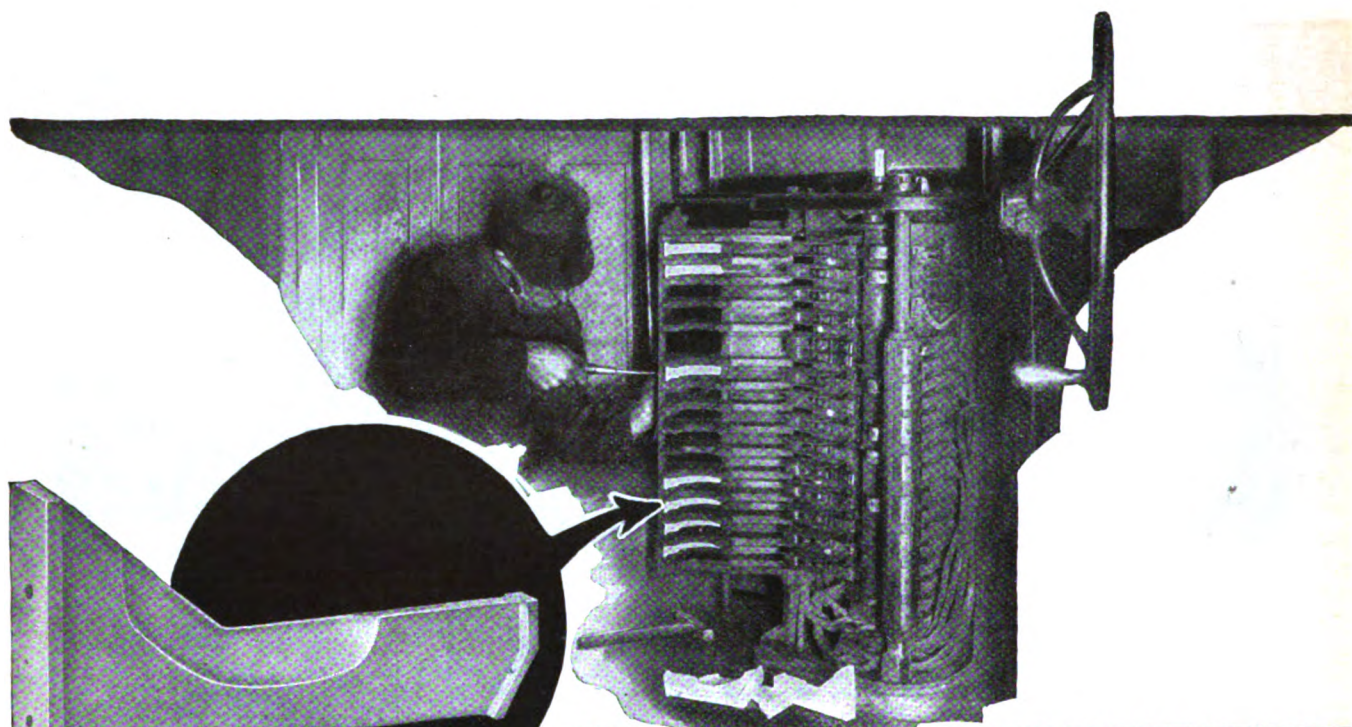
A special grout mixing car is used in mixing grout for paving filler. The completed pavements are rolled with a 5-ton roller operated by a 35-hp. railway motor. Power is supplied to the roller through a cable, the slack of which is taken up with a mine reel mounted at one end of the roller. One advantage of electric operation is that a licensed engineer is not required.

PLACING OF CONCRETE MATERIALS

Work trains which can be used for hauling materials in bulk are plainly marked as to capacity. Blueprints which will show the capacity of the cars for various heights of crown are furnished all employees who are required to distribute materials. These prints also show the height of sideboards which will give the designated level load capacity for each car and the quantity of materials required for a large number of types of track ditches. By their use, practically all calculations by the receivers on the job are eliminated.



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GENERAL ELECTRIC

New York, February 23, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 63
Number 8

Last Call for

St. Louis Midyear

THE St. Louis Midyear Meeting of the American Electric Railway Association on March 4 bids fair to be an exceptionally worth-while gathering. If one can judge by the work and planning of the St. Louis committeemen in preparation for the event, it is going to be one of the best the association has held.

A large attendance is also in prospect, judging by the unusually large number of advance reservations for hotel rooms and dinner places. One reason for this is that the program offers real compensation for the trip to the convention city. Traffic congestion, one of the most serious problems confronting the railway operating man, is to be given consideration throughout the whole morning session. The afternoon session will be devoted to another matter in which the electric railways have a keen interest—finance. The speakers at these sessions and for the evening banquet are men whose messages will undoubtedly give us food for further reflection.

Altogether, this last call to the meeting should induce you now to make your reservations—hotel, dinner, railroad—taking advantage of the reduced rate of fare available by use of certificates distributed by Secretary J. W. Welsh, 8 West Fortieth Street, New York City.

Physical Property Shows

Progress in St. Louis

THAT much progress has been made in the rehabilitation of the property of the United Railways of St. Louis is indicated by the several articles which have appeared in this paper describing new work of the company. In this issue are articles describing new cars, track, and provisions for economical power supply. An article was published last week on the new automatic substations. An article published Sept. 1, 1923, told how substantial saving was being made in energy consumption through the installation of power-saving devices, and another article, on the new carhouse and storage yard at Broadway and Taylor Avenues, was published in the issue of April 14, 1923. The substance of these articles shows that, apart from the work done by the receiver in readjusting the finances of the company, a great deal has been accomplished along the line of placing the physical property in such shape that it can function efficiently and give real service to the public. These articles are also mentioned here to suggest to delegates to the Midyear Meeting on March 4 the things which they will find especially worth looking up while in St. Louis.

A receivership usually is regarded as a very serious undertaking that may spell the ruin of a road. While this may be true in some instances, where the property has inherent possibilities there may actually be an advantage. The receivers are unhampered by the ordinary obligations to capital, so that money that would go for interest and dividends can be applied to deferred

maintenance and construction that for the good of the property should have been taken care of in the past. A wisely administered receivership, then, may be of advantage in making the property good enough that it may ultimately become a real asset to the security holders instead of the liability it must have been at the time of failure.

It has not been a simple task for the receiver, but the physical property speaks for itself, and it is understood the financial difficulties are on the road to a settlement.

It will be interesting to note the further steps in the reorganization of the St. Louis property, and see what the advantage is in having a receiver who has the courage to spend money in order to put the property in condition to save money and operate profitably in the future.

Exhibits, a Barometer of Business

THE American Electric Railway Association will decide at the Midyear Meeting at St. Louis the question of whether there shall be exhibits and the time and place of the next annual convention. A few of the leading manufacturers have been canvassed for their views on this subject, and the majority favor having the exhibits as usual, and at Atlantic City.

No one doubts that an exhibit is about the most economical method for the manufacturer to present his latest developments in equipment to a large number of railway operators. Furthermore, an exhibit is a very effective kind of sales activity. For the electric railway operator, it provides an impetus to keep abreast of the times.

Exhibits in this and all other industries have not been held in years of business depression, but not to hold the annual exhibit in a year of good business is to admit the industry is standing still. The improved financial condition of electric railways negatives such a suggestion. The record of actual sales of manufacturers in 1923 shows an exceptionally good year. The association's exhibit last year exceeded all previous records with a registration of 4,400 and exhibit space of more than 76,000 sq.ft. sold—15,000 more than at any previous exhibition. When no exhibit was held in 1921, the attendance fell to 1,500.

This year the electric light, power and gas industries and the car builders for the steam railroads will hold their usual exhibits.

The electric railways have a quarter of a billion dollars to spend for improvements during 1924. Surely the manufacturers can ill afford to omit the exhibit.

Can any one imagine the motor vehicle industry giving up the national automobile show?

Never was there greater encouragement or opportunity for equipment development work, for the rail-

ways are earnestly seeking means of providing better transportation. Hence the progressive manufacturer will be working this year strenuously on new ideas and will need the exhibit to give first showing to his new products, as well as to display his older products—which are always new to many of the delegates who have seen the thing advertised but have not seen it first hand.

Furthermore, while a convention at Atlantic City lends itself exceptionally well to an exhibit, it is desirable now and then to hold the annual meeting at some other city, perhaps where facilities are too limited to undertake an exhibit. This may be the case in 1925.

Increasing Substation Capacity, by Changing Units Has Advantages

A FEATURE of more than passing interest incorporated in the design of the St. Louis automatic substations described in the Feb. 16 issue of this paper is the arrangement for increasing the capacity of a station, not by the insertion of additional machines, but by the substitution of a larger unit in place of the one installed. The former method, which is the customary one, carries with it the necessity for anticipating, perhaps long in advance, the growth of traffic and consequent increase of load. This calls for a more expensive building, and possibly extra real estate. Although the space is provided for in the design, still there is a very considerable expense when it becomes necessary to install an additional unit, as the switchboard and all other auxiliaries must be changed accordingly.

With the St. Louis plan an increase in station load requires that the converter and its transformers must be removed and new equipment of increased rating substituted. Since modern machinery is practically always handled by means of remote control, the larger current does not necessarily demand a new switchboard, but only the substitution of necessary switches of correct rating. Such changes should be easier to make, and be less expensive, than the anticipation and installation of an additional unit.

Apart from the saving in idle investment prior to the increase in station capacity, there is the advantage that a new unit can be installed in place of a smaller one whenever the load exceeds but slightly the rating of one machine. This permits the use of machinery of such size that it approximates the daily loads much more closely than when the rating must be doubled at one operation. Of course, it is entirely possible to have units of different sizes in a manual station to approximate the demand. However, the most recent automatic substations with more than a single unit have duplicate converters so that they may be started interchangeably, thus increasing the reliability of the automatic control.

As a matter of fact, improvements in design have made it possible in the past for machines of double rating, or even larger, to be installed on the same foundations as the original machines. If the same progress can be anticipated in the future, there should be plenty of margin for growth in the system without the installation of additional units.

The major objection to the plan is that machinery must be removed from the station when its rating is increased. On a small property this would be a serious defect, but on a system as large as the United Railways, there will practically always be an opportunity to locate and use the smaller unit to advantage.

New Orleans

Does the Wise Thing

NEW ORLEANS has again acted wisely. For a time, however, it appeared that much of the good work done more than a year ago in reaching a settlement of the utility problem there would be negated by the refusal of certain members of the Commission Council to align themselves on the side of progress for the city. The story of the negotiations looking toward supplying the capital requirements of the New Orleans Public Service, Inc., as the local utility is known, has been told in the news pages as it unfolded itself.

First there was a dispute between the company and the city over the question of whether the average rate base for the year should be \$52,924,928 as claimed by the company or \$52,144,463 as claimed by the city. Thus there was a difference of \$779,864. There was room for honest difference of opinion in regard to the disposition of most of the items, but in the aggregate these items were not important enough to affect rates except ever so slightly even if all of them were allowed to the company.

This question, however, paled before the more important one of providing the funds necessary for extensions and improvements. The return permitted to the company on the rate base is $7\frac{1}{2}$ per cent. Bonds of the company secured by mortgage have been selling at rates which still reflect the uncertainties of the past, one issue to net more than 8 per cent and another more than 9 per cent. Financing by means of bonds, accordingly, was out of the question.

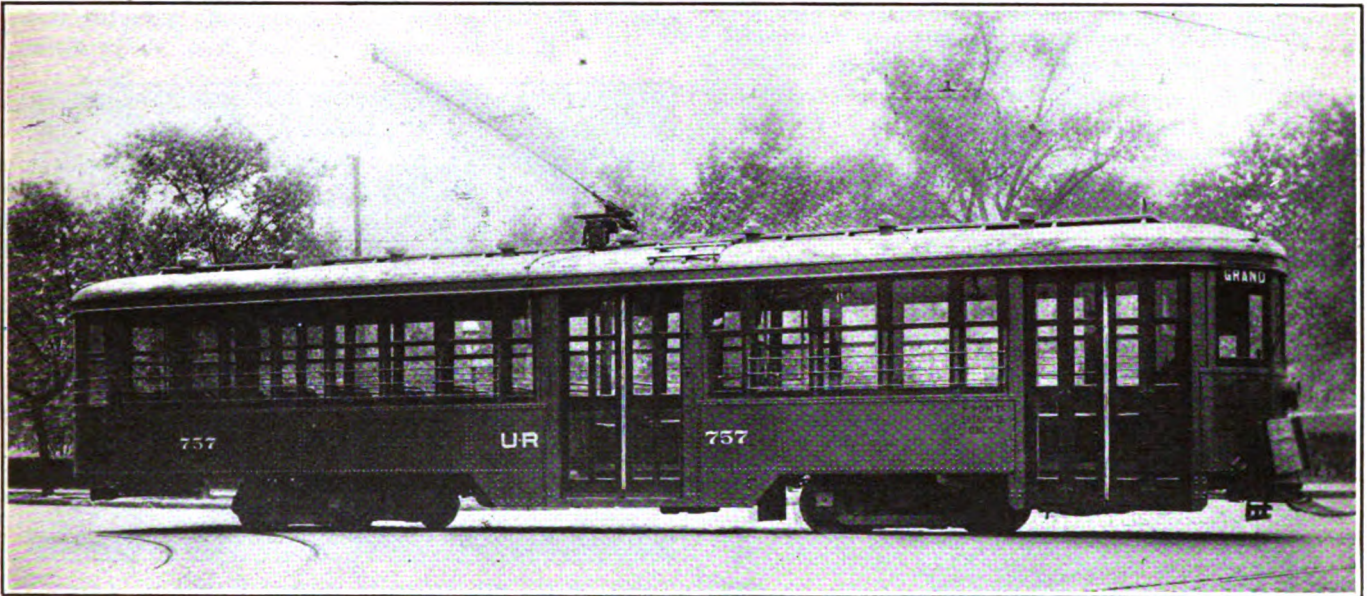
But the need of New Orleans was immediate. The Electric Bond & Share Company, owning the common stock, stood ready to purchase \$7,500,000 of additional common stock at par to pay a 9 per cent return if earned. This, of course, looked big to some of the representatives of the city. After all, however, the return fixed for the whole property on the rate base is $7\frac{1}{2}$ per cent, so that in the light of the risk taken by the holder of the common stock the rate of dividend was not incommensurate.

The financial set-up at New Orleans following the reorganization was \$42,000,000 of bonds and only \$12,000,000 of preferred and common stock. As a matter of fact, on the average rate base of \$52,939,371 for the year ended Sept. 30, 1923, the company earned a balance of only \$1,325,896 available for sinking fund requirements, dividends and surplus reserves, or 6.61 per cent on the rate base. Thus the Electric Bond & Share stood ready to stake millions of dollars on the prospects of the future. Yet it took a long while to win the members of the Commission Council over. But now that it has been done, the prospects are that affairs affecting the utilities in New Orleans will proceed along lines that will quickly result in all the advantages that follow when a public utility is so strengthened in its financial position that it can function financially and physically to the best advantage.

SOME most interesting papers and discussion on means to relieve traffic congestion and speed up local transportation were heard at Chicago before the Western Society of Engineers on Feb. 6 and 7. They are published in this issue and that of Feb. 9. They will be of special interest to electric railway men just now in view of the session to be devoted to the same subject at the St. Louis Midyear Meeting of the A.E.R.A.

St. Louis Front-Entrance, Side-Exit Cars

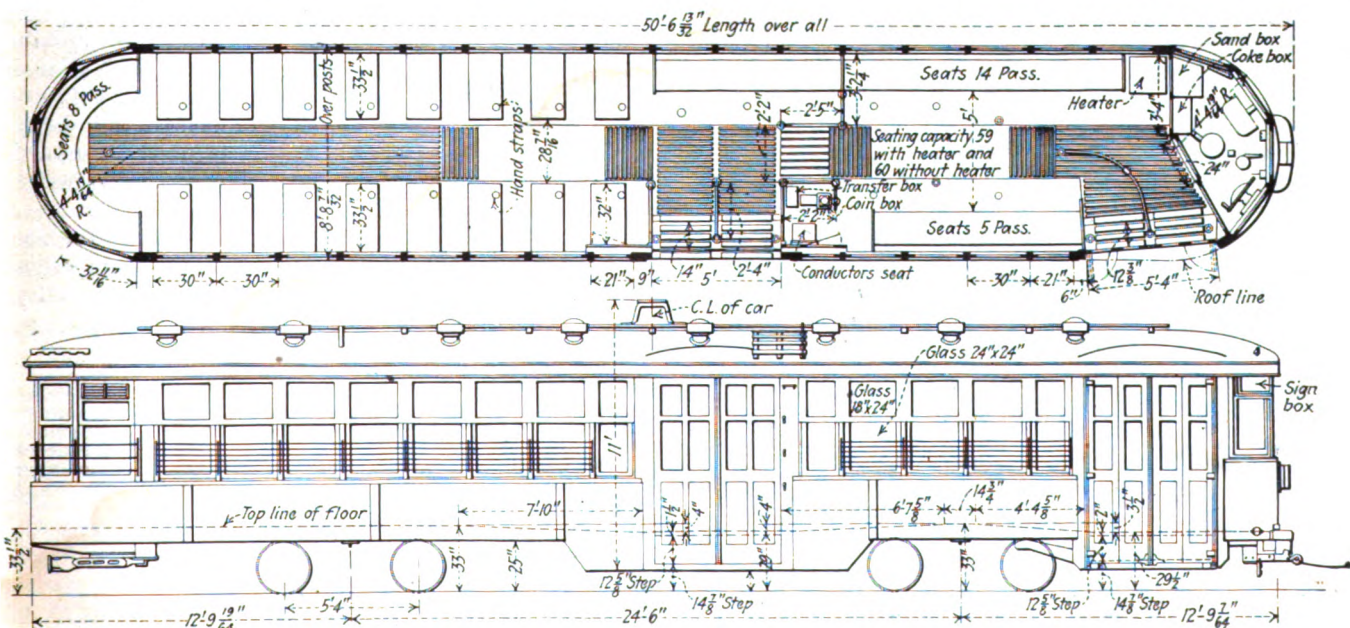
Fifty Cars Now Building Will Make Total of 201 of This Type Which Have Been Placed in Service Since 1920—Standard Design Retained Is Featured by Ramps in Floor, Inside Steps, Separate Motorman's Compartment and Aluminum Rails and Stanchions



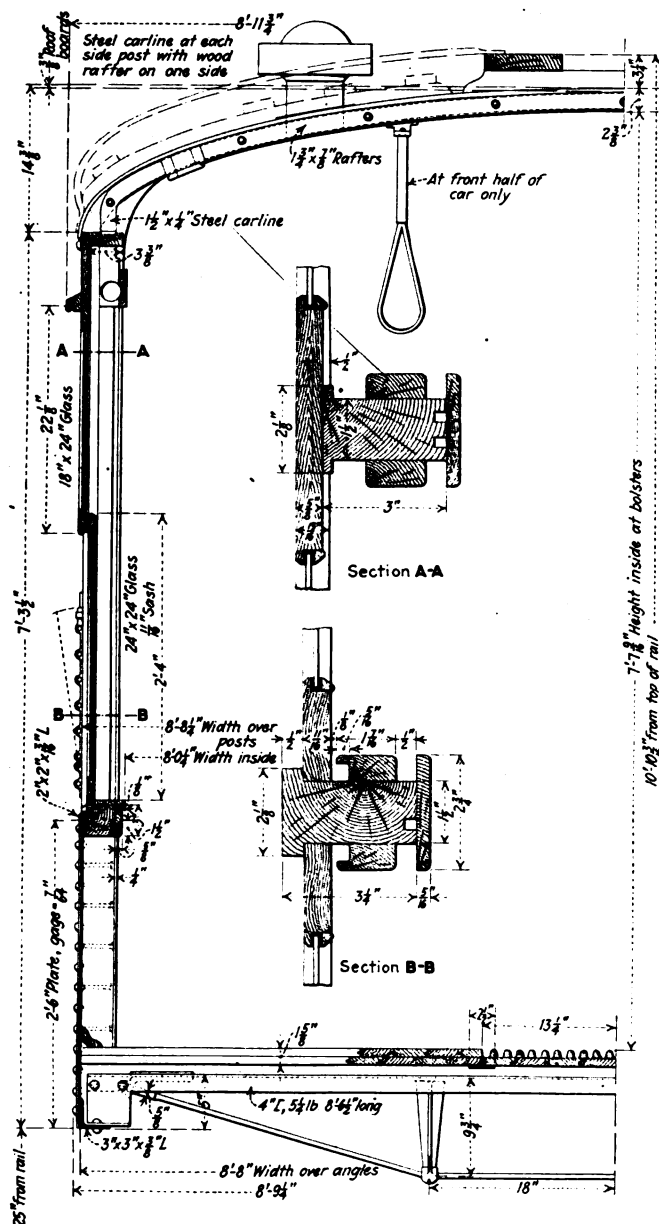
Fifty Motor Cars of This Type Are in Process of Construction for Use on United Railways of St. Louis

A GROUP of fifty front-entrance, side-exit motor cars now being constructed in the shop of the United Railways of St. Louis, under the direction of M. O'Brien, master mechanic, will give this property a total of 201 cars of this type in service when the present lot is completed. The design has been maintained standard for each group, and the new lot is therefore almost an exact duplicate of the first group, which was described briefly in *ELECTRIC RAILWAY JOURNAL*, Sept. 18, 1920, page 551. One important change has been made from the first lot of these cars, in that the more recent cars have been equipped with four 35-hp. motors whereas the first group had four 25-hp. motors.

One of the features of interest is the use of ramps at both the front end and the center section to eliminate drop platforms and folding steps, and at the same time to make possible the use of a single 12 $\frac{3}{4}$ -in. inside step, both at the center and at the front doorway. To accomplish this with 26-in. diameter wheels the floor of the car is carried as low as possible, a clearance of 3 in. being allowed for the light car body between the floor and the wheel flange. Additional clearance is obtained by having the bottom of the floor at the front end cut out in an arc corresponding to the wheel swing, so as to prevent the wheels from rubbing against the under side of the floor when the truck parts become worn. The



Low Step Heights Are Obtained by the Method of Ramping the Floor Arrangement of Floor Strips in Aisle Is Shown in Plan



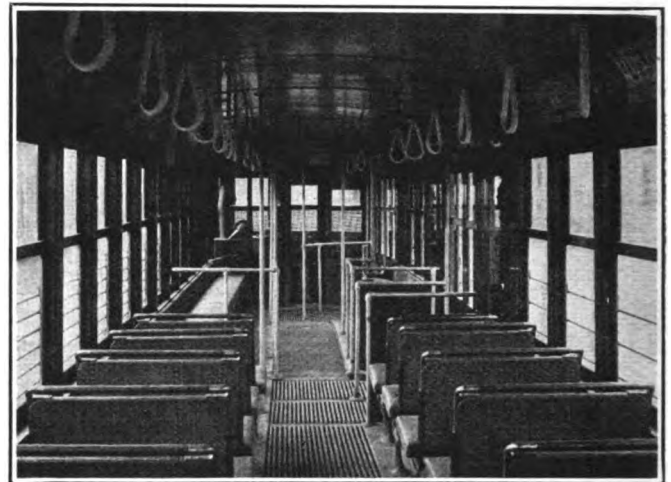
Steel Side Girder Framing and Wood Side Posts Are Used. Cross Sill Channels Are Installed with Web Horizontal to Give Additional Clearance

truck springs are designed so that they will go solid with a total deflection of 3 in., but normally will not reach this deflection with a maximum passenger load on the car.

All rails and stanchions used in the interior of the car are made of 1-in. aluminum pipe. To assist standing passengers, stanchions have been liberally provided in the front longitudinal section of the car and at the entrance and exit doors. In addition to the rail surrounding the conductor's position, a second rail has been installed on the opposite side of the car, extending out

from the longitudinal seat, so as to produce in effect a narrow aisle immediately opposite the conductor. This is to facilitate the collection of fares when the car is crowded. The arrangement of these rails and stanchions is clearly illustrated in an accompanying photograph.

A step height of 14 1/2 in. from the rail to the inside step is obtained, with an additional rise of 12 1/2 in. from this step to the car floor. The heights are the same at both the front and center door openings. From the edge of the step to the edge of the body aisle the floor ramps 1 1/2 in. at the center door and 2 in. at the front.



Floor Ramps and Aluminum Railings Feature the Interior. Note Motorman's Compartment at the Front End

The top of the floor at the bolster is 33 in. above the rail. To reach this point, a longitudinal ramp of 4 in. in 6 ft. 7 1/2 in. is provided from the center, and a similar ramp of 3 1/2 in. in 4 ft. 4 1/2 in. is put in at the front. The aisle is arranged with floor strips extending across the direction of movement, to prevent passengers from slipping. In addition the edges of the floor and steps are protected by Feralun step treads.

The cars are arranged for single-end operation. The motorman is provided with a compartment built into the front end of the body. In addition to the control apparatus, this compartment contains boxes for sand and coke. A Peter Smith hot air heater is located in the front corner of the car body, immediately back of the motorman's compartment partition.

The exit is placed immediately forward of the middle of the car. The door operating equipment is National Pneumatic and the cars are also provided with interlocking control, to prevent starting before all doors are closed. The conductor's station is at the forward side of the opening. He is provided with a transfer box, coin tray and fare box.

Designed for duty on heavy city lines, the cars are 50 ft. 6 1/2 in. long over all. They have a maximum width of 8 ft. 11 1/2 in. and are 10 ft. 10 1/2 in. high over trolley

GENERAL SPECIFICATIONS OF NEW ST. LOUIS MOTOR CARS

Length over all	50 ft. 6 13/32 in.	Control	K-35 G. R. 2	Step treads	Feralun
Width over all	8 ft. 11 3/4 in.	Line switch	Westinghouse 801-E	Sanders	Nichols-Lintern
Height over trolley boards	10 ft. 10 3/16 in.	Door operating mechanism	National Pneumatic safety interlocking	Registers	Security
Side post centers	30 in.	Interior trim	Cherry	Hand brakes	Peacock
Side sash glass	24 in. x 24 in.	Headlining	Agasote	Trolley catchers	Ohio Brass
Truck centers	24 ft. 6 in.	Sash fixtures	O. M. Edwards	Trolley base	Ohio Brass Form No. 1
Wheel base of trucks	5 ft. 4 in.	Curtain fixtures	Curtain Supply Co.	SUMMARY OF WEIGHTS	
Gage	4 ft. 10 in.	Curtain material	ring 88	Two trucks complete less motors	10,414 lb.
Wheel diameter	26 in.	Destination signs	Pantasote	Four motors	5,900 lb.
Type of truck	Commonwealth cast steel frame, built by railway	Ruzzers	Consolidated	Body complete with control and air brake equipment	23,086 lb.
Motors	Four Westinghouse 510-A	Fare boxes	Johnson	Total	39,400 lb.
Air brake	Westinghouse SM-3 with DH-16 compressor	Heaters	Peter Smith hot air		
Journals	3-3/4 in. x 7 in.	Headlights	Ohio Brass		

boards. Longitudinal seats are used in the front section and cross seats in the rear. The operation is on the pay-as-you-pass principle. The total seating capacity is fifty-nine passengers in winter and sixty in summer, when the heater is removed. Cross seats are spaced on 30-in. centers, which corresponds with the spacing of the side posts. The design gives an interior width of 8 ft. 1½ in. over the side post pilasters. Using a 33½-in. cross seat cushion, an aisle width of 28½ in. is obtained.

Straight side girder construction with wood side posts is used. The girder sheets are ¾-in. material reinforced with 3-in. x 3-in. x ⅝-in. lower side-sill angles and 2-in. x 2-in. x ⅝-in. angles at the belt rails. The horizontal flange of the latter is bent up at an angle of 24 deg. so as to provide for drainage.

Ash side posts of 3½-in. x 1½-in. section are fastened to the side girders by through bolts. The lower sash are of wood and are arranged to raise, while the upper

sash, also of wood, are framed in continuous lengths and fastened permanently to the outside of the side posts. Tenoned across the tops of the side posts are wood top plates, and 1½-in. x 7½-in. wood letter boards complete the side frame construction.

Flat steel carlins of ½-in. x ½-in. material are bolted to 1½-in. x ¾-in. ash carlins and are set on the top plate at each side post, to form the arch roof framing. The roof is covered with ¾-in. tongued and grooved poplar.

To obtain maximum clearance under the floor for brake rigging and other apparatus, the body cross sills, which are made of 4-in., 5½-lb. channel, are set on the flat instead of on edge. Round steel truss-rods on these cross sills are made of ½-in. material and are supported on malleable iron struts, 9½ in. long. The floor is of double thickness, 1½-in. material. Yellow pine is used for the under floor and on the sides, but in the aisle the top layer is replaced by maple strips.

How Shall We Solve Traffic Problems?

How This Work Is Being Organized in Some Cities and Some of the Results—Why a Broader Viewpoint Is Necessary—The Traffic and Transportation Plan Should Be Made for a City Double the Present Size—Greatest Need Is Leadership, and Railways Should Supply It

By J. Rowland Bibbins

Consulting Engineer, Washington, D. C.

IN A PREVIOUS article in the *ELECTRIC RAILWAY JOURNAL* for Nov. 10, 1923, some elements of the traffic problem, with which every large city and traction company is confronted, were analyzed and discussed as to the broader features. Now it seems desirable to inquire whether this vastly important matter is being handled adequately, what results are being secured, also to consider whether more effective and far-sighted methods and organization are not needed.

Traffic and transportation have assumed a new significance and importance within the last decade, for they now involve things outside the operation of the railway. In fact, the operating integrity of every large railway system is coming to be not a matter of how to run street cars better, but how to run them at all. The study of traffic today is not simply one of parking signs and police regulation, as most people think, but is one which should cover the following main elements:

1. Street and highway plan, for present and future.
2. Transit service—capacity and routing.
3. Traffic organization and control, vehicle and pedestrian.
4. Railroad terminal operations; marine, in port cities.
5. Relation to the broad city plan and general public welfare.

To illustrate, most railway men conceive the private automobile as the principal offender in traffic congestion. But in a recent traffic survey the writer found that commercial vehicle traffic averaged about one-half of the total automotive traffic in the downtown district of a large city and held practically constant throughout non-rush hours—a condition which is clearly brought about in this city by the extremely defective thoroughfare plan. Railroads have continued to concentrate their local traffic close into the business district, which results in cluttering up the streets with crosstown freight movement. Few industries have taken steps

toward efficient cartage control with definite routing for their trucks and delivery vehicles, such as that established some years ago by the Denver Tramway Company, in connection with its construction work. In port cities marine trucking traffic to industries and freight stations may also be found using passenger streets quite unnecessarily. Another source of congestion is that many commercial houses use the sidewalk and street for loading and are thus quite inconsiderate of the need for full street capacity.

EXAMPLES OF HOW PROBLEM IS BEING ATTACKED

How is the problem being studied? Three cases will illustrate.

1. In Baltimore, a traffic committee appointed by the Mayor has just reported after six months labor.* The report covers numerous detailed recommendations mostly pertaining to the central district. It gives little or no consideration of the proper relation of the central district to the entire city and the further development of local transportation to meet future needs. But it does lay great stress upon railroad grade separation throughout the city, citing seventy-seven locations for examination. All existing traffic regulations are proposed to be abolished and the entire matter put into the hands of the police commissioner without technical supervision or advice of any kind. And the far greater problem of an adequate transportation plan seems not to be comprehended in the report.

2. In Washington, the United States Senate committee of the District of Columbia, after long hearings, has finally reported to Congress. This report goes much further. While urgent recommendations are largely confined to disciplinary measures to secure quick relief, the report does recommend "a thoroughgoing engineer-

*This report was reviewed in *ELECTRIC RAILWAY JOURNAL*, Feb. 9, 1924, page 232.

ing survey" of local transportation and development covering:

Determination of conditions and facts from detailed traffic surveys.

Relative value of present streets and facilities.

Future trends and needs of Washington.

Means of simplifying street car routing and operation, and increasing loading speed.

Approximate cost of improvements and means of financing.

3. Indianapolis has perhaps visualized this program most concretely under the auspices of the City Plan Commission. Zoning is an accomplished fact in this city. The commission next turns to the transportation plan, broadly conceived, the first step of which is the development of a city-wide, comprehensive traffic thoroughfare system. These thoroughfares are being classified and designed for auto speedways, boulevards, local and rapid transit streets and heavy traffic streets, with particular reference to the by-passing of traffic foreign to the central business district.

The next step will be to develop traffic organization and control involving the usual multitude of details, particularly to afford relief to the central district.

The third step will seek improved rail routing and operation, particularly in the congested district, but also as it affects the entire transit system. This involves to some extent both previous steps, with these objects:

To untangle downtown traffic and railway looping by decreasing both car and vehicle interference so as to release traffic capacity.

To increase speed of transit through, and loading speed within, the terminal district.

To increase the facility of through movement and decrease necessity of transferring as far as possible.

To secure a better passenger distribution and pick-up throughout the business district.

To provide traffic capacity for inevitable future growth of the transit system, at the same time making a provision for the adoption of the motor bus when and where practicable.

The fourth step involves railroad terminals, line and grade separations, as all these factors involve city development, continuity of main thoroughfares and the relief of traffic and transit obstructions, now so serious. The sequence of these railroad developments is particularly important, and the location of new lines so as best to round out the city in residential settlement.

Other investigations are continually being reported by automobile clubs, electric railways, chambers of commerce, newspapers, civic clubs and the interminable sporadic efforts of local improvement associations. Most of these efforts are voluntary or directed toward the protection of definite interests.

Only in Boston, with its forty-two surrounding communities, has a well-conceived transportation plan been put under way. This is adequate in scope but unfortunately hampered by limited working funds. Chicago, Pittsburgh, St. Louis and Los Angeles have approached the problem in parts at different times.

What the situation needs is leadership. And the railway industry, with its personnel most skilled of any of these groups in the art of transportation, seems best qualified to and should take and hold leadership with courage and perseverance. It should assume a positive rather than a negative attitude; i.e., what to do rather than what not to do. To put the programme concretely:

1. Organize co-operatively adequate technical and

factual surveys of local conditions, traffic movement, and the needs of present relief and future development whether by rail, bus, rapid transit or steam suburban service. The financial support for such work should not be niggardly, but commensurate to its vital importance to the industry.

2. Develop a comprehensive traffic and transportation plan based upon this factual survey which shall furnish the authorities and people with a guide to reasonable future action and development. Minor details of traffic control are entirely subordinate in first importance.

3. Organize a competent local civilian advisory body to consider this plan, subject it to constructive criticism and to furnish the powerful support which such a body can give. This is its proper function.

4. Spread broadcast by every educational means properly available the theory, purpose and advantages of the transportation plan so that the authorities may be better qualified in their official actions to express more directly the enlightened opinion of the community.

5. Start now to carry out the plan as fast as conditions warrant.

Some detailed problems have received practically no study. Yet they are of the greatest importance. Many of these so-called traffic problems are subject to the same analysis as street railway and railroad operation. For example:

Efficiency of the police traffic signals and effect on track capacity, headway and routing.

Proper relation of signal duration to traffic volume. Best type of signal for varying traffic conditions—fixed, flexible, block signal.

Best means of segregating traffic, horizontally and vertically.

Adequate relief of congested district from foreign traffic.

Three-track express idea in traffic routing.

Determination of the average parking time demand for different classes of traffic and facilities needed for each.

Economic design of traffic roadways for their particular service.

Here are essentials for the future toward which every large railway system should be working:

Increase of 10 to 20 per cent in car schedule speed—imperative to meet private automobile competition.

Doubling the efficiency of use of roadways by traffic. It can be done now in many cases.

Large increase in efficiency of police signal control. This is the critical or key point of attack.

Development of cheap day storage by efficient alley-garages; municipal undertaking if necessary.

Development of limited-stop express service by car or bus to major outlying sub-centers whenever feasible.

Cartage control of commercial vehicles by business or industry operating them, especially routing.

Higher efficiency and control of off-track railroad freight movement, especially higher unit loads and routing.

Standardization of large vehicles to economize in the great cost of providing adequate roadways.

Development of the arcade plan of street widening, where full widening is not feasible.

More high-class railroading in traffic organization, movement and control.

Every city should be at work on its traffic and transportation plan. The more one studies these complex traffic operations, the more it becomes evident that one-sided or part solutions will be totally inadequate to secure lasting results even if temporary relief is secured. The scheme of organization proposed therein is simply in line with the modern tendency toward research. It embodies co-operative effort so essential in the final stage of the proceedings. We should plan now for a city of double the present size without stopping to quarrel at just what time this growth probably will be reached.

St. Louis Track Construction Includes Novel Features

Open Construction with T-Rail on Rock Ballast Is Used on Reservation or Private Right-of-Way in City Streets — Granite Flange Blocks Are Used with T-Rail in Paved Streets — Special Machinery Facilitates Construction Work

OF THE 518 miles of track of the United Railways of St. Louis, serving a population of 900,000 in the city of St. Louis and 100,000 in University City and St. Louis County, 144 miles are of the open T-rail ballasted type of construction. Approximately 17 miles of this track are located within the city and in incorporated suburban towns and are laid in reserved strips in the center or alongside of public streets. Adjoining large parks and cemeteries, these reserved strips are placed alongside of the paved roadway, while in other locations they are placed in the center of the street. This arrangement facilitates the movement of traffic by keeping the automobiles, etc., clear of the tracks. The crossings over the right-of-way are placed

Special deeds were prepared to transfer all property required for the 70-ft. street, and not yet dedicated to public use, to a trust company which held it in trust until the tracks were completed. Prior to the completion of the track, an agreement was entered into with each municipality through which the line ran to vacate the old streets upon the condition that the line was built and the new streets were dedicated. Upon completion of the track the trust company conveyed to the railway company its private right-of-way and then dedicated to public use the two 23-ft. streets on each side. Certain crossings were specified in the franchise ordinance passed by each city.

Since the completion of this line several of the streets



Concrete Center Pole Construction Is Used Extensively on Private Right-of-Way in St. Louis



Approximately 17 Miles of Track in City and Suburbs Are Laid in a Reserved Strip

at such intervals that the cars are permitted to operate at comparatively high speeds.

In some cases the city when improving the street has simply provided for pavement outside of the space occupied by the tracks and has permitted the company to occupy the reserved strip without any expressed franchise agreement. In such instances the railway, since it holds no title, is not required to pave the adjacent roadways. In other locations the company holds title to a private right-of-way in the center of a street and ownership obligates it to pay certain portions of the cost of paving the vehicular roadways. Such expense, however, is always considerably less than the cost of paving the space in which the tracks are located, so that the arrangement results in considerable economy.

An extension approximately 2 miles in length which was made some years ago into a comparatively well built up section west of the city furnishes an interesting example of the method used for acquiring a private right-of-way in a new district. The agreement to make the extension stipulated that the tracks were to be located in a 24-ft. private right-of-way between two 23-ft. streets, a total width of 70 ft. An existing street along the route varied in width from 50 ft. to 60 ft.

on each side of the tracks have been paved and the cost of the pavement of such streets has been considerably less than would have been the cost of paving the tracks had they been laid in a public street. These cities were of the third and fourth class and street pavements are paid for on the front-foot basis. The company, therefore, paid one-half the cost of improvement of roadways in each case.

Wydown Boulevard, in the city of Clayton, furnishes another interesting example of this type of construction. The tracks are located in a 30-ft. right-of-way on each side of which a 45-ft. street is built. A 5-ft. strip on each side of the right-of-way has been left after the subdivision and improved with grass and trees. The streets are well paved and are built up with very high grade residences, on land that sells for more than \$100 per foot.

A broad city planning idea has been generally accepted in St. Louis County. As a result the United Railways has received co-operation from the subdividers of lands along its county lines. In some cases the railway company has furnished tentative plans for the subdivision of a large number of tracts and has gone to considerable trouble to assist subdividers in order to



Rail Breaker Facilitates Track Reconstruction. The Wings on the Sides Shear Off Ties and Paving as the Rail Is Pulled Out

demonstrate that such land could be subdivided properly from a sales standpoint and at the same time leave satisfactory lines of communication across the tracks without an excessive number of crossings. After several years of such co-operation with land owners the engineers of the railway are generally consulted about proposed subdivisions and in almost all cases have been able to secure a great improvement in original plans.

TYPES OF TRACK CONSTRUCTION

Paved track in streets comprises a total of 338 miles and in addition there are 36 miles in carhouses and yards. Of this total 191 miles are laid with new modern rails on concrete foundations and paved with hard pavements, 85 miles are laid with obsolete types of side bearing girder rails on concrete foundations, 19 miles are obsolete types of side bearing girder rails on ballasted foundations and 45 miles are track special work.

The new rails used by the United Railways in paved streets are Lorain, 9-in., 132-lb., section 440; Lorain, 7-in., 103-lb. girder, section 426 or 478; Lorain, 7-in., 95-lb. T, section 400, and Lorain, 7-in., 91-lb. T, section 375. A large percentage of this T-rail replaced obsolete types of 7-in. girder rails which had been laid on concrete foundations. The 9-in. girder rail is used in the downtown district and the 7-in. is mostly in paved streets where there has been a large amount of vehicle traffic.

Six-inch, 100-lb. A.R.A. T-rail, series "A," which is used in 127 miles of track, is the standard type of rail in general use except in the downtown districts or where steel-tired vehicular traffic is heavy.



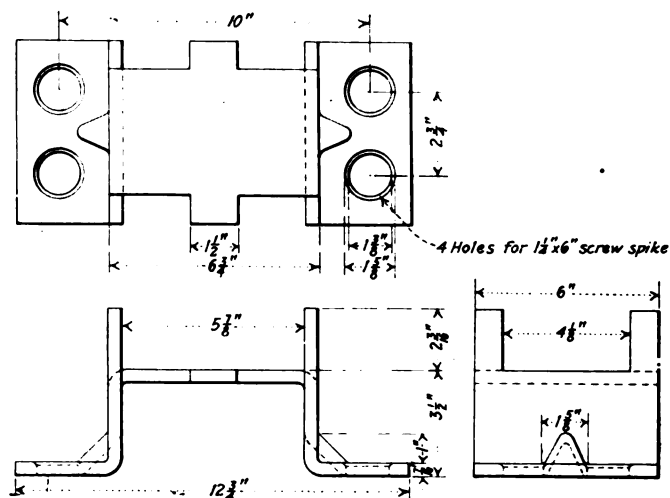
During Reconstruction Work, a Portable Siding for Work Cars Is Used and One Main Track Is Kept in Service

Most of the open track in private right-of-way is laid with 80-lb. T-rails on creosoted oak ties with gravel or broken stone ballast.

Where obsolete types of girder rails laid on concrete foundations are replaced with new rails the 100-lb. T-rail is used, and this rail is laid on a 3-in. forged steel chair manufactured with four lugs which bend down over the base of the rail to hold it in place. Tie rods are used on standard 6-ft. spacing to hold the rails to gage. Ties which are in bad condition in old concrete foundations, through decay or spike killing, are removed and replaced with steel ties of the M-25 Carnegie type. By using the steel tie in such work it has been found easy properly to surround the new tie with concrete.

The standard track foundation is at least 12½ in. thick, 6 in. of the material being under the ties. The concrete consists of a 1-3-6 mix. The ties are 6-in. x 8-in. x 7-ft. 4-in. hewn white oak, adzed and drilled for screw spikes in the material yard before delivery on the work.

On new foundations laid for 100-lb. T-rail tracks the Vaughn type of tie plate is used. This plate is made



Forged Steel Chair Used in St. Louis for Mounting 6-In. T-Rail on Old 9-In. Foundation

of soft steel ¾ in. x 7 in. x 10½ in., sheared so as to provide four lugs which can be bent down over the rail base. Screw spikes ¾ in. x 6 in., placed more than 1 in. away from the rail base, hold the plate firmly to the tie. No tie rods are used in such work.

All joints in T-rail tracks are made with rolled, ten-rivet, 32-in. Nichols joint plates, 1-in. rivets being placed with an 80-ton squeezer. Joint plates and rail ends are thoroughly sand blasted before the joints are made and the spaces under the rail head and around the rail base are filled with molten spelter.

Standard new 9-in. girder rail track construction is made up of a solid concrete foundation 15 in. thick with 6 in. of concrete under the ties, using the white oak ties already mentioned. Other details include ½-in. x 6-in. x 11-in. flat tie plates, malleable steel rail clips, ¾-in. x 6-in. screw spikes, sixteen-rivet, 32-in. forged Nichols joint plates and ¾-in. round tie rods with standard 6-ft. spacing.

SPECIAL WORK IS MANGANESE

Practically all of the special work used by the United Railways is of the solid manganese type. Standard switches have a 100-ft. inside radius and standard frogs are used as far as possible. Comparatively few triple frogs are in use and carhouse layouts are of a simple type, containing very few triple frogs or double

curve frogs. Switches and mates in carhouse special work are almost all open hearth material, with a 40-ft. inside radius. Spring switch locks are used on facing point switches in car yards and on main line tracks, but electric switches are used at the more important locations.

Nichols joint plates have been found to have an electrical efficiency considerably above that of the rail itself, and consequently no bonds are installed at these joints. Cross bonds between rails and between tracks are placed about 180 ft. apart or about every third rail.

Poles supporting trolley wires in streets are almost all placed along the curbs, very few being in the center of the street. Most of the metal poles used during recent years are the tubular steel or the "Bates" type. Reinforced concrete poles, 35 ft. long, have been used extensively on county lines or along private right-of-way. This type has been used for most of the center pole construction in open track.

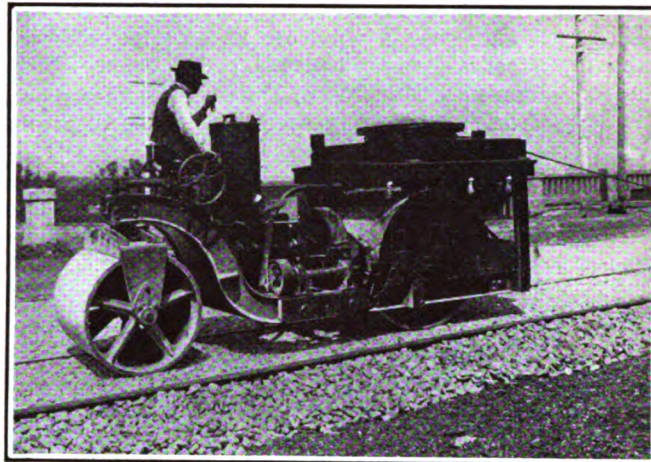
Track pavements during the past two years have been laid with new or redressed granite blocks of Missouri, Wisconsin or Carolina stone, but Missouri granite is being used almost exclusively for flange blocks in T-rail tracks. The street department of the city of St. Louis now insists upon the use of granite in track work, both for repairs, construction and reconstruction work. Paving blocks are generally laid on a sand cushion with a cement-sand grout filler, but in some cases the blocks have been laid on a cement-sand cushion with a cement-sand filler. For paving the 1-ft. space outside of the rails, special blocks 12 in. in length are purchased, and these blocks are laid on a cement-sand base and with a cement-sand filler.

TRACK CONSTRUCTION EQUIPMENT

The material handling equipment of the United Railways consists of twelve tool cars for division track foremen, approximately seventeen motor flat cars, nine motor trucks and seventeen trail flat cars. One Differential dump train, one Koppel dump train and four dump cars of the gondola type, three center dump ballast cars and two special dump trains complete the material handling equipment. The special dump trains consist of two-car units, each car containing eight dump boxes designed by the railway for distributing materials away from the track. The boxes dump over the sides of the cars in such a position that material is thrown almost completely clear of the track cut. The unit box arrangement has been found particularly satisfactory for distributing the proper proportions of sand and stone along the track for making concrete.

A rail breaking machine, two Thew shovels, one Clark pavement plow, air compressors and blasting cars make up the equipment for taking out old tracks. The Thew shovels unload directly into dirt trains which stand on a portable siding connected with a Kerwin crossover. This siding is dragged along the street by the work cars. It is of sufficient length to permit the dirt trains to serve the Thew shovel and at the same time permits the rail breaking machine to tear out the old tracks ahead of the shovels.

Old rail is removed with a rail breaking machine which consists of a two-drum 50-ton Clyde hoist, operating two rope cables each of 1½ in. diameter. The hoist is mounted in a car supported on a steam locomotive tender frame base. The front end of the machine is loaded down with ballast and at the rear end an "A"



An Electric Pavement Roller, Equipped with Cable Reel

frame controlled by air cylinder is mounted so that it can be made to bear on the rails. The heavy rope cables attached to rail tongs are brought down from sheaves on the top of the "A" frame to points on the rail about 7 ft. behind the car. The rail breaker tears up rails, tie rods, pavements and practically all ties in ballasted tracks. In concrete tracks, however, only those ties which are larger at the top than at the bottom are pulled out.

The concrete mixers in use are the Drake type fed by long chain conveyors. It is the experience of the United Railways that careful gaging of the materials placed alongside the tracks for concreting will insure a satisfactory quality, and the cost of handling is much lower than with other types of machines.

A special grout mixing car is used in mixing grout for paving filler. The completed pavements are rolled with a 5-ton roller operated by a 35-hp. railway motor. Power is supplied to the roller through a cable, the slack of which is taken up with a mine reel mounted at one end of the roller. One advantage of electric operation is that a licensed engineer is not required.

PLACING OF CONCRETE MATERIALS

Work trains which can be used for hauling materials in bulk are plainly marked as to capacity. Blueprints which will show the capacity of the cars for various heights of crown are furnished all employees who are required to distribute materials. These prints also show the height of sideboards which will give the designated level load capacity for each car and the quantity of materials required for a large number of types of track ditches. By their use, practically all calculations by the receivers on the job are eliminated.



A 5-Ft. Grass Strip on Each Side of Way Was Put in by Arrangement with the Subdividers

The sand is unloaded first for concrete work. It is leveled off and gives a windrow of material ordinarily about six feet wide and about six inches deep. Broken stone is then placed on top of the sand and the pile is made reasonably uniform. After this a specified number of sacks of cement per unit of length are unloaded on top of the broken stone. Spacing rods about eight feet long are marked to indicate the proper distribution of cement, and the laborers are required to dump one sack for each space indicated by this rod.

Energy Costs Reduced by Auxiliary Steam Plants

Two Steam Power Plants Operated by United Railways of St. Louis Take Peak Loads and Enable Company to Obtain Energy at Favorable Rate

IN ORDER to use hydro-electric power advantageously for railway purposes, the United Railways of St. Louis is operating two steam plants built in 1901 in combination with purchased energy derived from water and steam. The water power is obtained at a very attractive rate, but the load factor specified in the contract necessitates the use of these auxiliary plants to carry the peak during limited periods of the day. In addition, the ever-present possibility of low water and consequently restricted hydro-electric power makes it necessary to hold the steam plants in readiness to carry a portion of the load in the event of such a contingency. They are also available as stand-by plants in case of failure of either water or purchased steam power sources.

Before the company contracted to obtain hydro-electric energy from Keokuk, the United Railways had in operation three steam power plants of various capacities. Central station had a capacity of 12,000 kw. of direct current, Northern station had a capacity of 6,000 kw. direct current and 2,400 kw. alternating current and Hodiament station had 3,150 kw. direct current and 3,600 kw. alternating current. During this period a contract with the Union Electric Company of St. Louis allowed the railway to draw on the power company's plants for a demand load of 18,000 kw. This was available at the system load factor, which was approximately 38 per cent.

When water power became available at an attractive price, the quantity which could be purchased was limited and the load factor demanded by the power company was considerably above that at which steam power was being obtained. The daily energy allowance under the contract was 295,000 kw.-hr., with a maximum demand allowance of 22,380 kw. This is approximately equivalent to a load factor of 55 per cent. As the purchased steam-generated energy was being obtained at the system load factor, 38 per cent, it would have been necessary to decrease the load factor on this steam service in order to take advantage of the available hydro power. This, obviously, would have seriously increased the cost of energy from the steam power system, even had this been available.

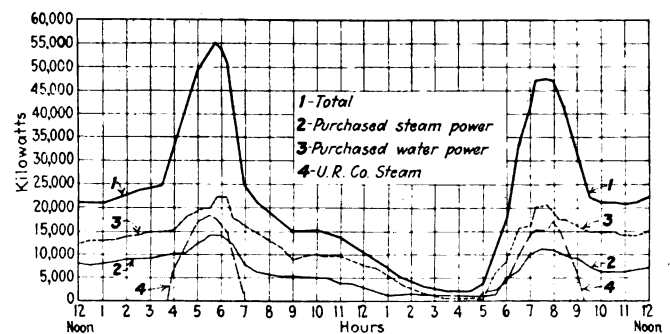
Two of the existing steam plants operated by the railway company were therefore kept in service to absorb the peak loads on the railway system. These two stations are now operated about seven hours a day, four during the morning rush and three during the evening. Hodiament station was shut down and

QUANTITY USED AND COST PER KILOWATT-HOUR OF ENERGY FOR UNITED RAILWAYS OF ST. LOUIS, YEAR 1923

	Total Kilowatt-Hours	Cents per Kilowatt-Hour
Energy generated in company's steam plants	25,391,646	1.520
Steam-generated energy purchased	48,448,800	1.355
Hydro-electric energy purchased	108,894,302	0.697
Total for year	182,734,748	0.899
Average cost at direct-current switchboard		1.189

one 1,200-kw. alternator was moved from there to Northern. Since the locations of the two operating power plants were advantageous for use as distributing points, two 2,000-kw. rotaries were put into Central station and two 1,000-kw. units were put into Northern station. Additional new transformer and rotary converter equipment was installed at various points on the system so as to make available the new 13,200-volt water power.

This was the condition of the power supply system of the property when it was recently decided to install additional substation capacity to carry the load created by the operation of the new cars. Five new automatic substations were recently put in service. These were described in detail in last week's issue of this paper. Although the voltage regulation had been satisfactory in the districts in which the new stations were located, their installation was required primarily to relieve



Daily Load Curve Shows Effect of United Railways' Steam Plants in Reducing Peak for Purchased Energy

overloaded adjacent stations. Their use has increased the voltage in the district to some extent. In addition the greater number of distributing points has permitted the release of approximately 125,000 lb. of copper feeder wire, which was taken down. This wire is being used in other districts to reduce line losses and improve voltage conditions where long direct-current transmission is required and where there is not enough load to justify the erection of additional stations in more advantageous locations. Furthermore, it is expensive to obtain a convenient source of alternating-current power for such stations.

The cost of energy from the two steam stations now operated by the railway company is considerably higher than that of purchased energy from steam, charging only operating and maintenance costs. It is believed, however, that in carrying a portion of the peak load and thereby improving the power factor for purchased energy, their use reduces the total cost of energy appreciably, by making it possible to take full advantage of low-priced water power. Their use as stand-by plants for emergencies also gives them an additional value.

The load which is carried by the three sources and the comparative costs of energy are given in the accompanying table for the year 1923.

Planning Relief for the Pedestrian*

Traffic Relief Is Considered from the Standpoint that It Is the Pedestrian for Whom the Transportation Systems Are Made Necessary—Various Means of Increasing Street Capacity Such as Safety Islands, Loading Platforms, Two-Level Streets and Building Arcades Are Discussed

By Hugh E. Young

Consulting Engineer, Chicago, Ill.

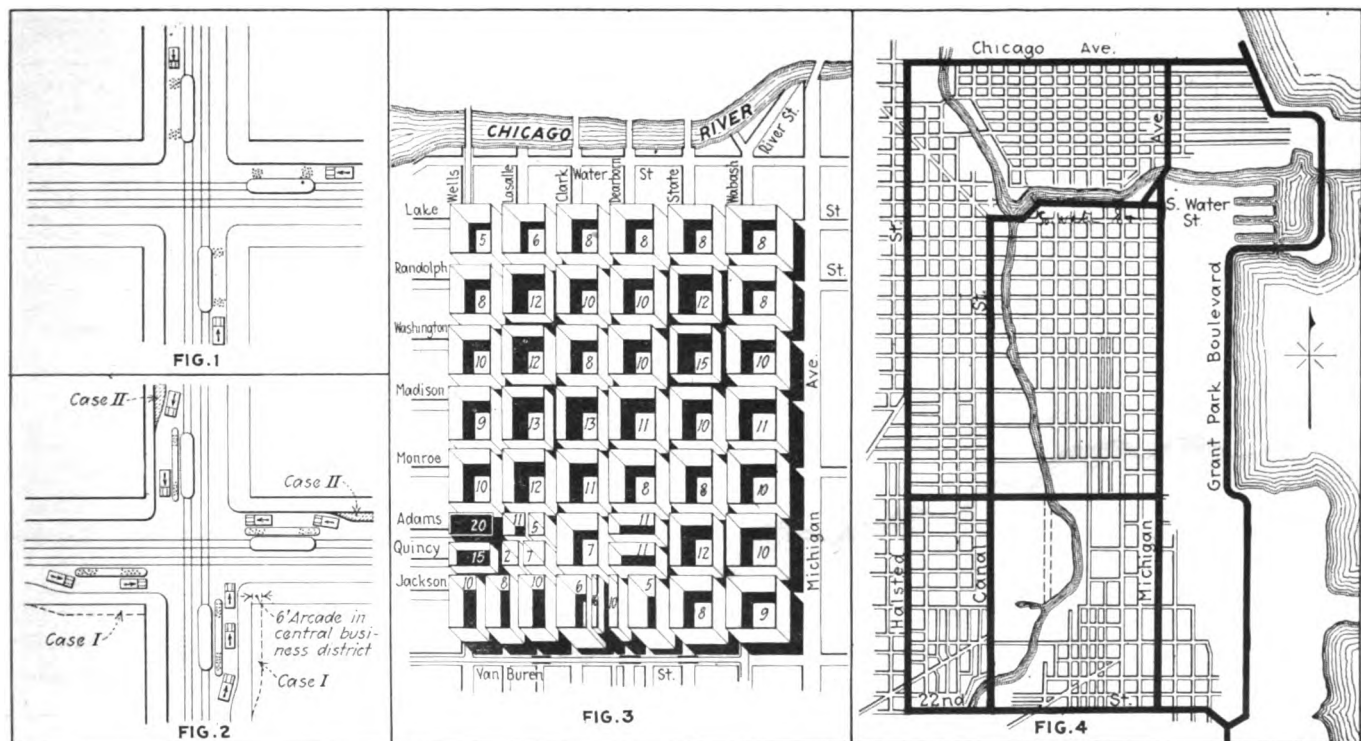
PEDESTRIAN traffic should be analyzed and treated as an integral part of the complete traffic scheme. It is not a by-product of transportation, but is the enabling means whereby the transportation systems are made useful and practicable. It is therefore of vital interest to the transportation lines that the pedestrian has a convenient and safe access to the terminals at the beginning and end of his journey. Pedestrians, by virtue of prior right, have first claim on the right-of-way of our thoroughfares.

In most cities the authorities are more particularly concerned with the regulation and control of vehicles

moving and meanwhile let the pedestrian traffic take care of itself.

The widespread use of the automobile has a sinister aspect in the 15,000 persons killed on the highways of this country last year and the 1,700,000 injured. Our thoroughfares have practically become the right-of-way of the motorist. The pedestrian is left to shift for himself at street crossings. In Chicago and environs 720 persons were killed last year, and in New York 1,000 were killed.

If the railroads had killed 720 persons in Chicago last year, they would have been forced to elevate their



The Increasing Intensity of Congestion Is Due Largely to Concentration of Buildings in a Small District

Fig. 1—Present conditions at street intersections, showing how traffic is blocked by loading street cars.

Fig. 2—Proposed widening of roadway at intersection to provide space for loading platform. (I) Maintaining full width of

walk. (II) Utilizing space between walk and curb.

Fig. 3—The average height of buildings in the Loop at the present time compared with the height allowed by ordinance. The black outlines show the present average

height by blocks, while the light outlines show the height limit, 264 ft. Figures indicate the present average number of stories.

Fig. 4—The Chicago Plan provides for wide quadrangle streets permitting through vehicle circulation outside the congested Loop District.

than with the rights and conveniences of the pedestrian. The 10 per cent of our population in vehicles has created our traffic congestion problem, as a result of which millions of people are inconvenienced and endangered every day on our streets and highways. The principle now followed is to keep the vehicle traffic

tracks or be banished from the city. Already the city has caused the railroads to spend \$100,000,000 in elevating their tracks in order to avoid grade crossings, but little attention is paid to the casualty list resulting from the 260,000 motor vehicles loosened on our streets without schedules, without right of way, without semaphore signals.

Figures for the casualties caused by automotive ve-

*Abstract of a paper presented at the convocation of the Western Society of Engineers, Chicago, Ill., Feb. 6-7, 1924.

hicles of various kinds, in Chicago, have been published in various reports. Because the truck, bus and cab are used more intensively than the private automobile, a correction should be made, based on the hourly use and flexibility of each class of vehicle. Giving the cab a factor of 100, the bus 70, the truck 50, and the automobile 30, and applying these corrective factors, we derive the following results:

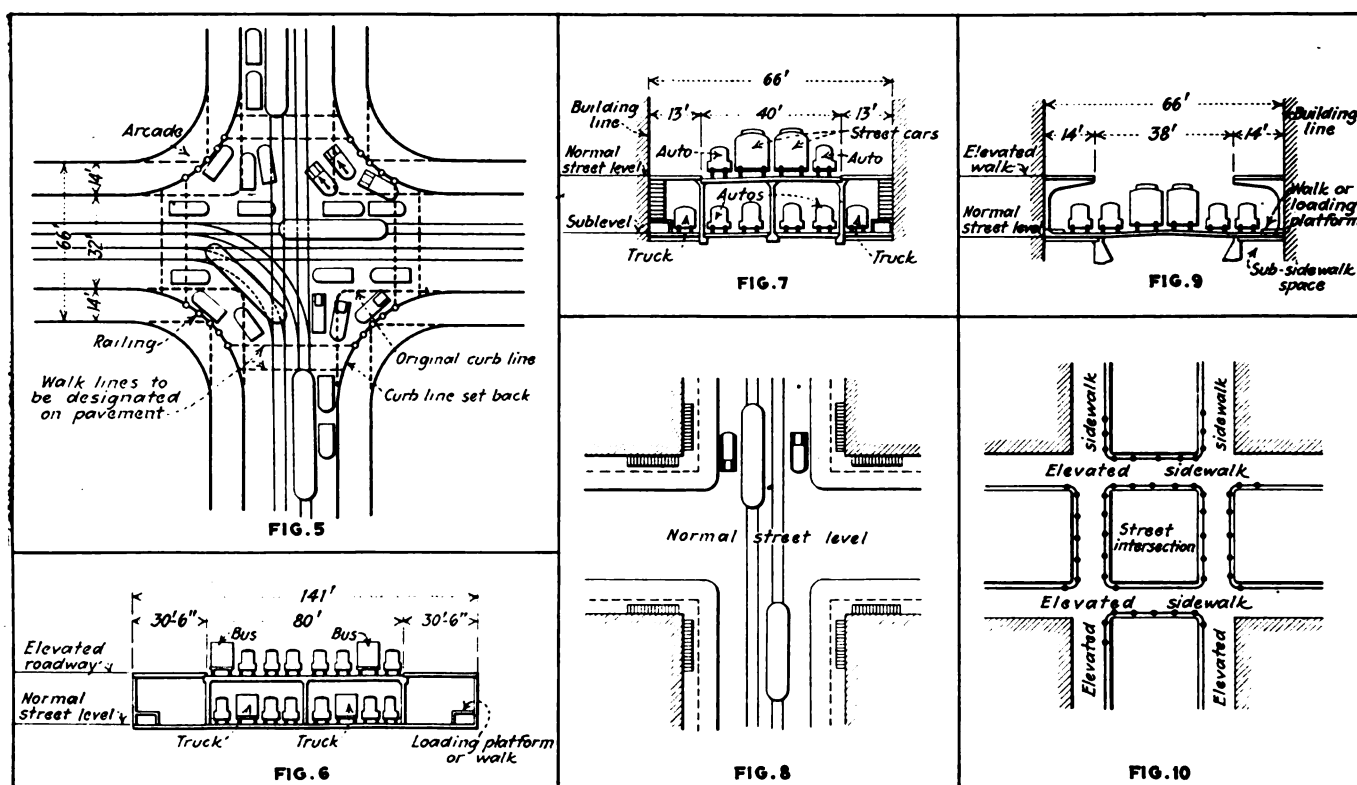
Type of Vehicle	Number of Cars	Number of Cars X Factor	Number of Vehicles per Death
Automobile.....	234,000	70,200	184
Truck.....	45,000	22,500	153
Taxicab.....	5,500	5,500	52
Bus.....	230	161	54

A daily pedestrian traffic movement of approximately 10,000,000 takes place in Chicago. Of these about 3,000,000 are to, from and in the central business dis-

vision for loading platforms in the streets, supplemented by safety islands opposite such loading platforms. Such loading platforms and islands require lighting and maintenance, but this provision is as logical, consistent and important as the other items for which the taxpayers' money is expended.

Islands and platforms will require additional roadway space at these points. This can be obtained by using the sidewalk space when available, otherwise by condemning property opposite the area affected. This plan is shown in Figs. 1 and 2. The feature of loading platforms and safety islands is used quite extensively in many American cities, but in general provision is not made for maintaining the full width of roadway.

The main cause of congestion in the Loop District of Chicago is the concentration of enormous business



Some of the Plans for Separating Pedestrian and Vehicle Traffic

Fig. 5—This plan for relieving congestion at intersections provides for the setback of the curb and marked walkway lines for pedestrian crossings.

Fig. 6—A cross-section of the present two-

level street on Michigan Avenue north of the Chicago River.

Fig. 7—Cross-section of a 66-ft. two-level street, with second roadway beneath the surface.

Fig. 8—Plan of the upper or surface level of the two-level street shown in Fig. 7.

Fig. 9—Cross-section showing arrangement of elevated sidewalks.

Fig. 10—Plan of elevated sidewalks shown in Fig. 9.

trict, and about 7,000,000 are to and from the manufacturing and industrial section outside the central business district, and between the home and local factory, store, mill, or other place of employment. The pedestrian usually finds it necessary on his trip to cross streets and perhaps a railroad right-of-way, and to dodge street cars and motor vehicles before boarding the vehicle in which he rides to his destination.

ADEQUATE SAFETY ISLANDS AND LOADING PLATFORMS PRACTICAL

The most practical and economical means of protecting and directing pedestrians at loading and unloading points in business districts where subways or elevated passenger bridges are not practicable is adequate pro-

in a small area, housed in a comparatively few blocks in buildings of great height and fed by all classes of transportation. We have an average of ten floors over the entire area. Fig. 3 shows the average height of buildings in each block in the most congested district in the Loop, also the height limit to which each block can be constructed in accordance with the building ordinance. This development, of course, would seem impracticable because it is doubtful that the means of transportation, now inadequate, could be doubled to meet the additional traffic that would be developed. The present average height of buildings in the Loop District is ten stories, and even with subways the present street facilities would be inadequate to handle the traffic.

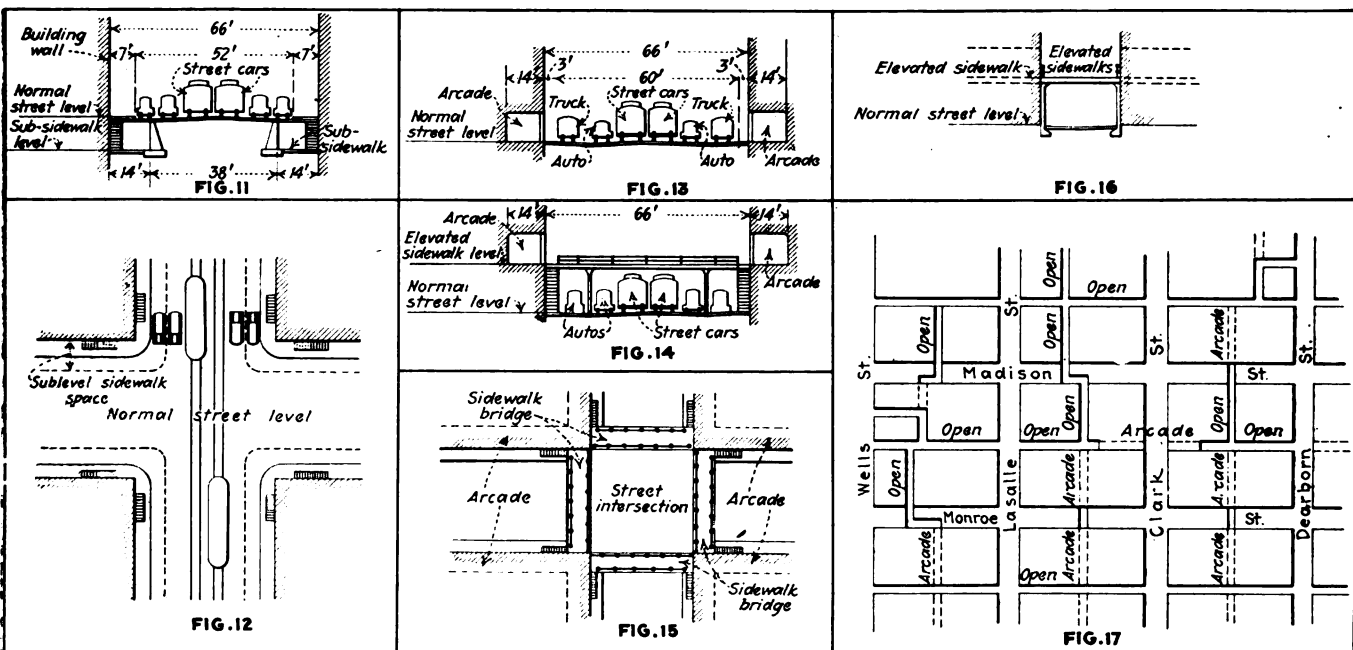
Pedestrian traffic counts made in 1923 by Major R. F.

Kelker, Jr., chief engineer for the committee on local transportation of the City Council, showed that there were forty-one buildings for each of which more than 4,000 people passed out in six hours. These counts showed an average movement of 22,100 persons every fifteen minutes, with a maximum of 38,140 persons for each fifteen-minute period during the rush hours.

The intensity of pedestrian traffic is confined largely to the central business district and densely built up sub-centers. In Chicago 1,000,000 people travel to the Loop and back again daily. Nearly three-quarters of a million people land on the downtown street systems in a space of about two hours in the morning and rush away again at the close of the working day in an even shorter time. Streets of the Loop, the great clearing house for more than 3,000,000 people, are jammed with pedestrians all day long—3,000,000 pedestrian trips are

tion of major projects. These would relieve to a limited extent the rapidly increasing street congestion. Their success will depend upon the degree with which the traffic regulations are enforced. Among the temporary expedients which would give some measure of relief are:

1. Prohibiting parking of vehicles on car line streets.
2. Safety loading spaces at street car and bus stops.
3. Traffic in the Loop District should be governed by the movement of pedestrians instead of vehicles, even though this increases vehicular congestion.
4. Signals maintained and operated by the city should be provided at all important street crossings.
5. Through routing all classes of vehicular traffic as well as street cars. Cars and buses that cannot be through-routed should be turned back at the edge of the congested district.



Arcaded Sidewalks and Elevated Sidewalks in Alleys Are Means of Increasing Street Capacity

Fig. 11—Cross-section of street with sidewalks beneath the street level.
Fig. 12—Plan of street with normal and sub-level sidewalks.

Fig. 13—Cross-section of street showing building arcades on the normal street level.
Fig. 14—Cross-section of street showing arcades on elevated level.
Fig. 15—Plan showing arrangement of arcades on elevated level.

Fig. 16—Cross-section showing elevated sidewalk in alley.
Fig. 17—Plan showing location of alleys in one section of the Loop District, with elevated sidewalks partly in arcades.

made every day into, away from and between the large buildings of the Loop.

Taking the street cars off the streets and putting them into subways would not entirely relieve the traffic hazard from the standpoint of the pedestrian. It would help, no doubt, but after all the street cars carry 74 per cent of the passengers and only form about 10 per cent of the number of vehicles in the Loop.

The various schemes to facilitate the movement of traffic and the reduction of danger to pedestrians may be divided into three groups. The first includes improvement in present traffic facilities; the second deals with general improvement to the city as a whole; the third covers special developments dealing with particular locations such as the Loop District, which represents only one-quarter of a square mile or only one eight-hundredth of the city's area.

Group No. 1 includes improvements which could be put into effect at once without waiting for the construc-

6. The quadrangle streets of the Chicago Plan provide wide thoroughfares outside the Loop District to avoid excessive right and left-hand turns in the Loop (Fig. 4).

7. Streets should be marked with lanes for pedestrian traffic. A "Through Street" stop signal should be placed on all through street crossings to warn and direct the pedestrian.

The improvements possible in Group 2, comprising those applying to the city as a whole, includes the following:

1. Construction of loading platforms lighted and maintained by the city at all principal corners, such as those shown in Figs. 1 and 2 and referred to previously.
2. Safety islands, lighted and maintained by the city, at complicated street intersections, such as at a diagonal street.
3. Cutting back street corners to the lot line and arcading buildings at the corners for sidewalk pas-

sages. A street crossing at some distance back from the corner would enable pedestrians to pass without interference from right and left-hand turning vehicles (Fig. 5).

4. Construction of two-level streets on important truck thoroughfares in the congested area (Fig. 6).

Group No. 3 includes various special developments for the relief of congestion within the Loop area. It comprises many schemes, each of which has certain advantages and disadvantages. Some of these plans are given briefly below.

SYSTEM OF TWO-LEVEL STREETS

A comprehensive system of two-level streets throughout the entire Loop District has been proposed, with the lower level depressed beneath the present surface. This plan, shown in Figs. 7 and 8, has a number of advantages, chief among which are the following:

Local vehicle traffic could use the lower level, thus facilitating through automobile and street car traffic on the upper or normal street level. Business property would have frontage on both levels, so that all trucking to buildings in the Loop could be handled on the lower level, thus giving convenient access to railroad and boat freight terminals or delivery stations. Automobiles could be parked on the lower level along the building fronts, if desired. The street capacity, of course, would be doubled by having two levels.

The principal disadvantages are: The two-level development would require radical changes in existing building arrangements. The lower level streets would require an elaborate ventilating system to eliminate the carbon monoxide danger. Pedestrian traffic would not be materially improved. A rebuilding of the utilities in the streets probably would be required. The high cost naturally is a disadvantage.

TWO LEVELS ON SELECTED STREETS

The corollary of the last plan would be the selection of certain north-and-south and east-and-west streets for the two-level plan, supplemented with elevated sidewalks on the remaining thoroughfares. By this means the automobile and pedestrian traffic could be separated on the two-level streets from commercial vehicle and street car traffic. The streets on which the two-level structures would be placed would have the advantages previously cited for two-level streets.

The objections would include all those mentioned for the more comprehensive plan, and also the two-level streets in connection with elevated sidewalks would lack accessibility unless side ramps were provided, which would take space and would require extensive condemnation of property.

ELEVATED SIDEWALKS

A comprehensive system of elevated sidewalks, as shown in Figs. 9 and 10, would give the pedestrian a free way for travel in the entire Loop District, and would permit the present sidewalk space on the normal street level to be used for roadway purposes. The traffic capacity of the street would thus be more than doubled.

The main objection to the elevated sidewalk is that it destroys the utility of the existing building arrangements. Stairways at frequent intervals, and bridges over the street intersections, would be required. The varying height of the floor lines of adjacent buildings makes it difficult to construct a sidewalk to fit the pres-

ent buildings without the use of stairs. An objection of vital importance in Chicago is the obstruction offered to the construction of such a system of sidewalks by the present elevated railroad system.

SUB-SIDEWALKS

A somewhat similar arrangement could be had by placing the sidewalks beneath the present street level, as shown in Figs. 11 and 12. This would give a free sidewalk space for pedestrians independent of other traffic. The Loop buildings could have show windows on both floors, thus increasing the display space. Cutting down the width of the normal street-level sidewalk to 7 ft. would provide for an additional line of traffic in each direction. This would more than double the capacity of the street for vehicular traffic. Stairways at street intersections would give pedestrians access to the street level, as well as to the basement floors of all Loop buildings. The sub-sidewalks would provide protection from the elements, and would give convenient access to any proposed subway system.

On the other hand, the construction of passageways under the street intersections would be difficult and expensive on account of the present utilities in the street. There would be difficulty in the lighting and draining, and additional police protection would be required. The removal of the space now occupied by buildings beneath the sidewalk would be necessary.

STREET CAR SUBWAYS

Street car subways would increase the schedule speeds possible with the cars, would reduce traffic congestion to the extent that it is caused by the street cars on the surface of the street and would remove the hazard of loading passengers on the street; but it would still expose the pedestrian to the hazard of automotive surface vehicles.

BUILDING ARCADES

Arcades of the buildings on the present street level are shown in Fig. 13. This arrangement would allow the existing sidewalks to be used for roadway space, increasing the capacity of the street. Pedestrians would be protected from the elements, which would be of advantage with the additional window display that should be provided for the buildings. The area under the present sidewalks can be covered with reinforced concrete slabs to support the pavement, using the space on each side of the street for a public utility gallery.

This construction, however, presents a series of legal, financial and construction problems and it does not provide any improvement in traffic conditions at the street intersections.

Arcades on the second floor level, Fig. 14, should have all the advantages of the ground level arcades, and in addition should be made to serve as elevated sidewalks by the construction of bridges over the streets. They have the same disadvantages as arcades on the first floor, and in addition there is lack of accessibility. The variation in height of the second floors of the buildings presents a difficult construction problem. The legal and financial objections also hold.

ELEVATED SIDEWALKS IN ALLEYS

In Chicago there is a quite extensive system of alleys, so that elevated sidewalks might be installed in some cases in them. This construction, shown in Fig. 16, would give all the advantages of elevated sidewalks on

the street with respect to the movement of pedestrians. It would also reduce the number of extensive structural changes, as compared with second floor arcades and elevated sidewalks on the streets. It would create an independent means of pedestrian circulation at the second-floor level throughout the Loop.

There would be a number of disadvantages and limitations to this plan. It would require bridges over street and alley lines, as shown in Fig. 17. The blocks in the Loop District usually have alleys in one direction only, and these are not all in straight alignment. In blocks where alleys do not exist, it would be necessary to create arcades through the buildings. The roofing over the alleys would form a serious obstacle in the fighting of fires in adjacent buildings.

It is not the development of any one system of trans-

portation alone that will best serve the pedestrian in his journey from home to place of employment and back again. It is the harmonious combination of the automobile bus, street car, elevated car and steam road transportation system which is necessary for the solution of the Chicago Loop traffic problem.

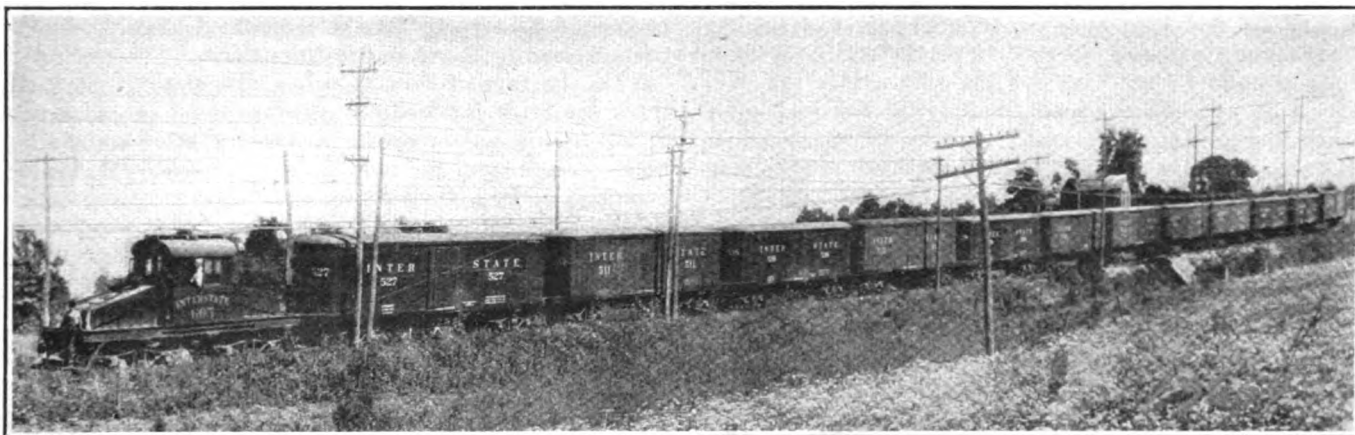
The problem of providing adequate means of transportation and safeguarding pedestrian traffic is acute. It is obvious that the problem in the Loop must be solved by the development of several traffic levels owing to the nature of the building development. It has been demonstrated by a very exhaustive study of local conditions and similar construction in other cities that a lasting street development in a vertical direction is practicable and is not an impossible engineering undertaking.

Progress in Interurban Freight in 1923

In Three Central States Material Additions to Net Revenues Have Been Made by Handling Freight—Over a Thousand Cars Now Used, and Daily Loadings Approximate 500 Carloads

By T. H. Stoffel

Railway Department, Westinghouse Electric & Manufacturing Company,
East Pittsburgh, Pa.



A Twelve-Car Locomotive-Drawn Freight Train on the Interstate Public Service Company's Lines

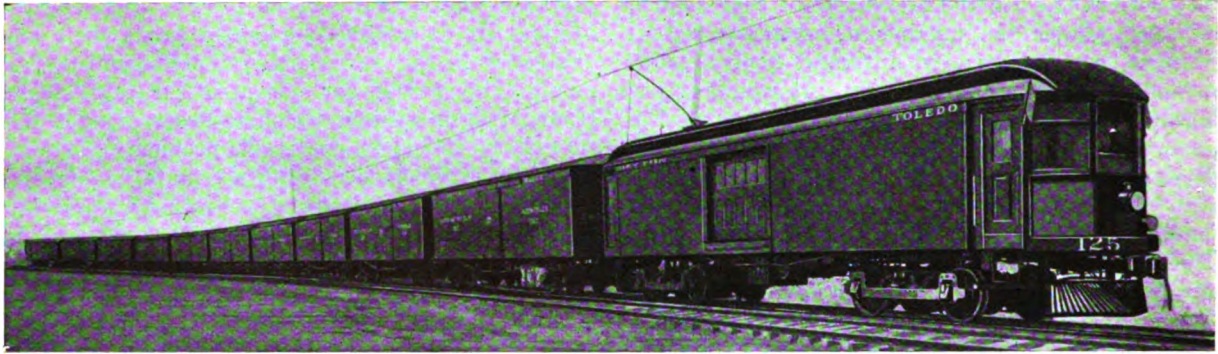
THROUGH the handling of freight, the electric interurban railway is becoming an increasingly important factor in the life and prosperity of the communities and territory served. This is particularly true in the industrial section comprising the States of Indiana, Ohio and Michigan, which now boasts a network of interurbans aggregating more than 4,000 miles and serving practically every community of importance in that territory.

While the average interurban line was not designed physically for the handling of freight, it is readily adaptable to the transportation of certain classes of both carload and less-than-carload commodities, of which there is an enormous tonnage available in the territory mentioned.

For many years the freight service rendered by interurban lines was confined to the transportation of small packages, etc., which could be taken care of in the baggage compartments of passenger cars. This was undertaken more as an accommodation to shippers than for the revenue involved. The continual demands of the

public, however, made it necessary gradually to provide and add special equipment and facilities to take care of freight tonnage, and the development of this phase of traffic almost automatically reached a common carrier basis.

It is only in recent years that electric railways have made any attempt to analyze their freight service from an income and cost standpoint. It is generally conceded that any allocation between freight and passenger business, made with a degree of fairness, indicates that the transportation of freight is highly profitable for electric lines. Investigation has invariably developed that the net returns from freight operation, when properly and economically conducted, are much greater than from passenger traffic, based on the additional investment required for this service, and which is comparatively small, inasmuch as the major facilities necessary to conduct a freight business, such as roadway, track, power plant, executive and operating organizations, etc., already exist. Of course this statement is predicated on the fact that the railway is already fully equipped



On the Dayton & Troy Line "Baggage Car" Locomotives Are Used in Freight Service

for passenger business and has a complete operating organization for that service.

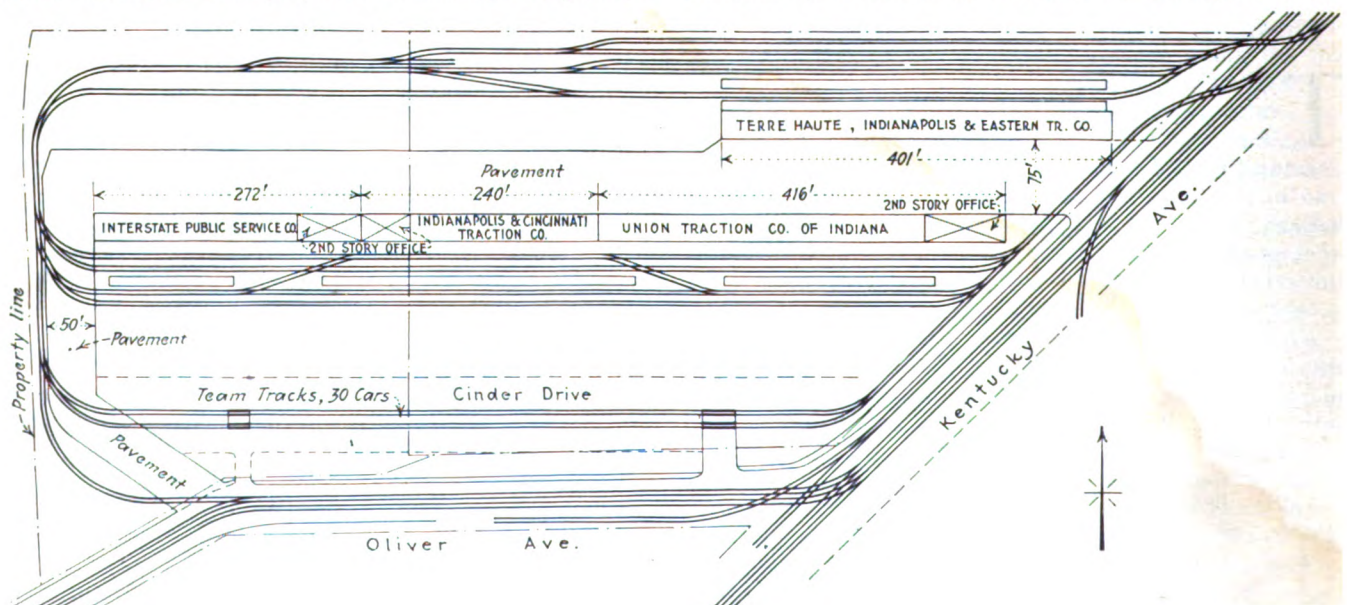
Much progress has been made in the last year or two in the development of freight operation, until at the present time approximately 275 motor box or express cars, 700 trail box cars, a score of electric locomotives, 100 stock cars and many cars of other types are employed in freight service in the territory under discussion. The average daily loading approximates 500 cars, most of which are moved at night, when passenger service is curtailed or discontinued, thus making unnecessary any additional investment in power machinery, and at the same time increasing the load factor of existing power facilities and tracks. Power plants and rails which were previously practically idle between 10 p.m. and 6 a.m. are now kept busy twenty-four hours of the day in revenue producing service. Freight trains of from four to eight or ten cars are the rule rather than the exception, and on some roads, notably the Detroit United Lines and the Interstate Public Service Company, trains of from ten to twenty cars each are hauled with electric locomotives. Thus the added benefits are secured of lower train labor and power costs per car or per ton-mile resulting from the handling of heavier train units, and at the same time movement over the road is expedited, since freight and passenger trains do not conflict.

The development and handling of this great tonnage have brought up many problems new to interurban operation. Such, for example, are the making and publish-

ing of through joint rates and divisions, and necessary rules and regulations governing them; the methods of auditing interline accounts; establishing of through operating routes; the interchange of equipment in joint service; standardization of rolling stock for through interline movement, etc. Much credit is due the traffic, auditing, and mechanical associations affiliated with the Central Electric Railway Association for the progress which has been made in arriving at satisfactory solutions of these problems.

Notwithstanding the large tonnage handled during the past year or two by electric lines in the central territory, the rolling stock, terminals and other freight facilities have been wholly inadequate to take care of more than a fraction of the business available, and the movement necessarily has been confined largely to less-than-carload or merchandise shipments.

This shortage of cars, together with the lack of team track facilities for loading, has prevented the securing of a vast amount of the more remunerative and desirable carload tonnage which is available. However, straight carload business has not been entirely neglected, as is attested by the hundreds of cars of such commodities as iron and steel articles, rubber tires, cement, building material, livestock, etc., that have been moved. While in most states the handling of livestock by interurban lines is prohibited by law, special legislation permits this in Indiana. As a result, the group of electric roads centering in Indianapolis handled 11,596 carloads of livestock to and from Indianapolis stock-



The New Union Freight Terminal at Indianapolis Will Have Warehouse and Track Capacity of 100 Cars

yards during 1923, which was approximately 30 per cent of the total receipts at those yards.

Generally speaking, the character of the freight service to be had on interurban electric lines is far superior to that furnished by any other means of transportation. Trains for handling interline business have been so scheduled that shipments moving over from two to five or six different lines, and for destinations up to 300 or more miles, are available for delivery to consignees within forty-eight to sixty hours, which is frequently from two to ten days better than the service provided by steam roads, and in many cases is better than can be obtained from the American Railway Express at considerably higher rates.

The value of the service which can be rendered by electric interurban roads is emphasized by the fact that the Southeastern Express Company, operating over the steam roads of the South, has contracted with the Interstate Public Service Company for the handling of its express service into Indianapolis and for destinations beyond, via Louisville. This business formerly moved via other Ohio River crossings in connection with steam line service.

Many extensions in joint rate and traffic arrangements have recently been negotiated and put into effect among the Ohio-Indiana-Michigan electric lines, and through merchandise cars have been scheduled covering practically all important terminals in the territory. For example, overnight delivery of shipments is made between Canton, Akron, Cleveland, Ohio, and Toledo, Detroit, Lima and Fort Wayne; between Detroit and Grand Rapids, Kalamazoo and Jackson, Mich.; between Indianapolis and Louisville, Fort Wayne, South Bend, Dayton, Springfield and Terre Haute. Second-morning delivery is assured between Cleveland, Toledo, Detroit and Indianapolis, Springfield, Dayton, Columbus, Ohio, and between Louisville and South Bend, Ind. Third-morning delivery is given between Louisville and Detroit, Cleveland, Toledo, etc. These are merely a few of the joint operating schedules which have been put into effect and are maintained. Still further improvements are under way and will be made operative soon.

Undoubtedly more progress was made during the year 1923 than in any similar period. Several hundred cars have recently been added or are on order, and terminal warehouses and facilities have been enlarged and new ones constructed at important points. Probably the most notable terminal improvement in the country is that now under construction at Indianapolis at a cost of approximately \$1,000,000. This terminal will be used jointly by the Terre Haute, Indianapolis & Eastern Traction Company, the Interstate Public Service Company, the Union Traction Company of Indiana and the Indianapolis & Cincinnati Traction Company. It is expected that the first units of this terminal as planned will be ready for service by April 1.

The immediate facilities at this terminal, as shown in the line drawing, will consist of the present T. H., I. & E. warehouse, which is about 400 ft. long and which will later be extended to double that length, and a warehouse 928 ft. long now nearing completion. To begin with, the terminal will have warehouse and transfer track capacity of approximately 100 cars at a single setting, and team track space for an additional fifty to sixty cars. Separate offices will be provided for each of the lines using the terminal. More space is available on the terminal property for another warehouse about 800 ft. long and also additional team tracks, which will

be installed as the business develops. This new terminal will obviate delays to trucks and vehicles in delivering consignments for shipment, and will effect material economies and at the same time expedite movement in the interline transfer of freight.

With adequate terminal facilities and sufficient rolling stock to take care of the business, it is estimated that from three to four times the tonnage handled at present may be had by electric lines in the territory under discussion, with possibilities for still further development.

Telling the Railway Story to the Public in East St. Louis

BEING a firm believer in the value of newspaper space for winning public good will, W. H. Sawyer, president the East St. Louis Railway, has for several years been conducting a series of talks with his customers—the riding public—through this medium. The results accomplished have been so good that the company is now preparing a booklet for distribution to East St. Louis business men, local organizations and executives of other railways, illustrating samples of various types of newspaper advertising used during 1923. In a foreword Mr. Sawyer says: "I believe in newspaper advertising—hence this booklet to show by a few typical 'ads' how we used newspaper space in 1923.

"A few of our outstanding reasons for advertising are:

1. We believe it is our duty to our customers to keep them informed of what we have done, what we are doing, and what we are trying to do.

2. As a purely business proposition we should sell transportation, merchandise our wares, and the best way to do this is through the columns of the newspaper.

3. Our advertising has been most helpful in enlisting the loyalty and co-operation of my associates who have a just pride in both our endeavors and our accomplishments.

"Just one further thought—advertising is worse than useless unless backed up by actual performance. To inspire respect and confidence through advertising we must be wholly honest in our endeavors to give service—efficient, satisfactory service—to our customers."

The advertisements are run chiefly in the East St. Louis local daily paper. An insertion is made in each Sunday issue and several are run during the week. The contents of each insertion are made as simple and direct as possible. The company's policies, courtesy of trainmen, safety, desire for co-operation, cleanliness of cars and financial statements are the principal subjects. The space used is rarely very large and great care is taken to avoid anything spectacular.

An attempt is made to take part in all local events of general interest. Paid advertising space is frequently used for this purpose with the idea of identifying the company with local civic activities.

Among the terse comments made by Mr. Sawyer in the booklet are the following: •

To promote public safety it is necessary to secure public co-operation—and the use of newspaper advertising is essential.

Courteous, helpful motormen and conductors plus good service properly advertised make appreciative satisfied customers.

Co-operating customers will commend courteous conductors—if you give them a chance.

Our customers are certainly entitled to complete financial data—also to honest explanations as to any delay in service.

These ads assist our customers in appreciating that a token dropped in the fare box pays for the service received and no more.

We believe that our customers should be kept posted on

the facts concerning municipal ownership of transportation systems so they will not make the mistake other cities have made.

It is a part of our duty to give publicity to endeavors of a semi-public nature which are beneficial to our home community.

The interest of the company and the civic community are mutual and advertising that helps develop civic pride is mutually beneficial.

Holiday greetings give us an opportunity to tell our customers how we appreciate the way they have met our efforts to give good service.

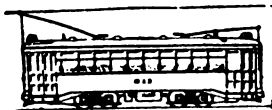
SHOP MORE

(In East St. Louis)

From 10 to 4
(In East St. Louis)

And You'll Avoid the Crowds
(In East St. Louis)

And If You Want the Safe,
Economical, Handy Way
Use Your

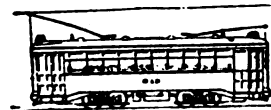


(In East St. Louis)

The men who handle the cars
on the East St. Louis Railway
Lines stand fairly and squarely
before the public as men who
are rendering a very necessary
service in an efficient and
courteous manner. They de-
sire not only to keep old custo-
mers but to secure new ones by
rendering satisfactory service.



Collisions Happen
Even With the
Best of Drivers.
Why Not
Relieve Your Mind
of Worry?



The Safest Way

The Most
Economical Way

The Thinking
Business Man's Way
to Ride to Work



Typical samples of selling
service - of increasing the riding
habit - by the use of a somewhat
indirect appeal which keeps the
idea of riding the street cars
in the minds of both present
and prospective customers.

Much Time
You Lost
for a
Space?



We believe that public
transportation is a bulk transaction only
from the standpoint of statistics.

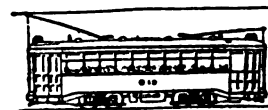
It is the desire of every mem-
ber of this organization to give
individual service to every
customer.



And You Ever
Have Any Thought
As To
The Safest Way
To Ride
Down Town To
Business?



The human organization which
makes up the personnel of The
East St. Louis Railway Company
is giving good service because
each individual in it has a sin-
cere human desire to give good
service.



Association News & Discussions

Chicago Transportation Discussed by Western Society of Engineers

Relation of Various Elements in Traffic Problem Analyzed—Elevated and Subway Sidewalks, Elimination of Street Crossings for Pedestrians, Traffic Signals, the Motor Bus and Steam Suburban Traffic Discussed

LOCAL transportation in Chicago was the subject of the mid-winter convocation of the Western Society of Engineers, held in Chicago Feb. 6 and 7. The papers dealt with practically all phases that make up the traffic tangle in that city, including the private automobile, taxicab, pedestrian, street car, elevated lines, motor bus, and the steam suburban line.

Various suggested schemes were discussed for facilitating pedestrian traffic and safeguarding the pedestrian, both in the congested Loop area and the outlying business areas. Papers on design and construction costs for elevated sidewalks, by J. H. Sawyer, bridge designing engineer Bureau of Engineering, and T. A. Evans, designing engineer Board of Local Improvements, city of Chicago; private automobile traffic, by Z. C. Elkins, manager Chicago Motor Club; through streets, by E. S. Taylor, office manager Chicago Plan Commission; and synchronized signal control, by William G. Beard, safety director Yellow Cab Company, were abstracted in this paper, issue of Feb. 9. Various schemes for facilitating and protecting pedestrian movement were discussed in a paper by H. E. Young, consulting engineer, Chicago, abstracted elsewhere in this issue.

In the discussion it was stated that although the traffic control signals installed on Michigan Avenue had slightly slowed down the average time of a trip through the traffic controlled area in the non-rush period, it had materially expedited the movement of vehicles during the rush. It was also contended that the extension of this system to the remainder of the business area would be impracticable and would materially retard the movement of street cars even beyond the existing conditions.

CO-ORDINATING BUS AND TROLLEY

Bus operation as a factor in local transportation was discussed by J. A. Emery of Ford, Bacon & Davis, consulting engineers. Mr. Emery spoke in place of John A. Ritchie, who was unable to be present. Mr. Emery stated that the American people were primarily interested in good service and were willing to pay for it. "The rate of fare," he said, "should be determined on the basis of the quality of service rendered, and the education of the public to this fact is the paramount issue in the solution of the transportation problem in all communities.

"The motor bus in the local trans-

portation problem of large communities has a real opportunity for service. It can be operated where only very light traffic exists. Under general conditions the motor bus can be supported on a population of 250 per mile, whereas under present price conditions, a street railway would require at least 1,500 per mile for like conditions. Where it is operating over city boulevard and park systems, the double-deck bus creates a large proportion of its own business. Analysis of the business of the New York and Chicago coach lines has shown an estimated pleasure riding of 25 per cent of the total. For a totally motorized city service, however, it is not expected that the proportion of pleasure riding would be as large as this."

One phase of bus operation which has not received the attention which it warrants is the adaptability of the bus to a combination of local and express service on the same street, Mr. Emery stated. In addition, there was strong reason to believe that the bus could be combined with existing car service in some places, so as to give a combination of express and local service, the cars running express and the buses carrying passengers along the street between the express stops.

Still another important possibility of bus operation, Mr. Emery believed, is a graded service. Many people would be willing to pay a higher fare for an assured seat, more comfortable ride, or saving in time.

One problem connected with the operation of motor buses which Mr. Emery brought out, is that of determining the wear on pavements resulting from their operation. When the bus is required to pay this cost, a considerable advantage which it now enjoys over the street car will be eliminated.

STEAM RAILROAD SUBURBAN TRANSPORTATION

The extent and scope of steam railroad suburban transportation in Chicago and its suburbs was treated in the report of a special committee of which F. E. Morrow, assistant chief engineer Chicago & Western Indiana Railroad, is chairman. This report traced the history of this form of transportation from its inception for the steam railroads handling suburban traffic in Chicago. After a review of the service furnished by each of these roads, the committee concludes that its greatest value is in those sections where the character and employment

of the residents require rapid transit to the central part of the city, and that its growth depends largely on the growth of the communities which it serves. The service furnished is the truest type of rapid transit in the city. This is attained by having relatively few station stops along the line; motive power that is capable of high speed and roadbed that will sustain it; by providing tracks with few obstructions and no congestion, and by having at most only two downtown stations that are located within easy walking distance of the Loop.

Due to the competition from elevated and surface lines, which offer frequent service within the city moderately close to the Loop, combined with the growth of suburban communities, the steam railroad haul has constantly become longer. The steam suburban lines, except the Illinois Central, are not well suited to handle short-haul traffic, because such traffic would interfere with the speed at which the long-haul traffic could be handled, which would be a distinct loss to the suburban communities. In addition the districts of short-haul traffic are in most instances populated densely enough to support other forms of local transportation which afford more frequent service.

The Illinois Central, being favorably located and having a sufficient right-of-way to provide not only separate tracks for this service, but also local and express tracks, is enabled to provide both local and express service without interference with the two kinds of suburban service, and also without interference with its other railroad business.

C. H. Mottier, office engineer Illinois Central Railroad, outlined some of the details connected with the new Illinois Central suburban development. George W. Hand, assistant to the president Chicago & Northwestern Railroad, stated that suburban business should only utilize latent facilities available on a given property. The extent of this operation must, however, necessarily be limited and dictated by the primary consideration of providing adequate trunk-line service. Due to the high investment in terminals and right-of-way, and the extreme importance of providing for future expansion, he considered it highly impracticable to use steam railroad right-of-way for rapid transit service. Any permanent assignment of existing facilities to such purposes will usually be followed by the necessity of acquiring more right-of-way facilities to handle the pressing needs of increasing through business.

EXTENT OF CHICAGO TRANSPORTATION

A paper by Britton I. Budd, president Chicago Rapid Transit Company, making suggestions for future rapid transit development in Chicago, was read by E. J. Blair, assistant to the president. This paper is abstracted elsewhere in

this issue. In the discussion, Mr. Blair said that the load factor of the elevated lines in Chicago is approximately 35 per cent, that is, the total number of passengers carried in twenty-four hours is 35 per cent of the number carried in one hour during the maximum peak, multiplied by 24.

C. V. Weston, consulting engineer Chicago Surface Lines, read a paper on the Surface Line traffic, which is abstracted elsewhere in this issue. R. F. Kelker, Jr., commented on this and some of the more important phases of the other papers which were read during the meeting. He illustrated the tremendous increase in riding habit and the demand for transportation in the United States, by pointing out that although the population had increased only 20 per cent in the twenty years 1900-1920, the ton-miles and passenger-miles on carriers had trebled. With a population increase rate of approximately 1 per cent per year, this vast increase in the demand for transportation had occurred.

Elimination of parking in the Loop area, he contended, would give a considerable measure of immediate relief from congestion. He commended Mr. Elkins for his broadminded stand on this subject, and approved the idea proposed by Mr. Elkins, of having a separate traffic commission with control of traffic throughout the city. Rigid traffic regulations must be instituted and enforced before any permanent improvement in the conditions in the business can be affected. Unless this is done, Mr. Kelker said, every improvement in the Loop will result in attracting an additional number of private cars into the business district, and the condition will thus again be aggravated.

Pedestrian accidents in the congested district, according to Mr. Kelker, are low in number compared with those in the outlying sections of the city.

Connections between the various lines of steam railroad suburban lines and a rapid transit system, at certain outlying points, was suggested as a means of relieving the congestion due to suburban traffic. A unified transportation system under unified management was held to be the only way successfully to settle Chicago's transportation requirements.

A tentative report including basic principles for solving the transportation problem was presented, so as to invite discussion. It is the intention to complete the report and include certain suggestions made at the meeting.

DIFFICULTIES OTHER THAN PHYSICAL IN TRANSPORTATION RELIEF

At the dinner Mayor Dever pointed out that the physical phases did not constitute the most important parts of the transportation problem, holding the financial and legal phases to be even more important and difficult of solution. Any plan must be submitted to a vote of the people. The difficulty in financing an extended system is that under existing law it is impossible to grant a franchise of sufficient duration to allow the development to be carried out with private funds. As the representative of the city's interests in the solution of the transportation problem, the Mayor said that there was

no intention to confiscate the property of the existing security holders, but urged the advantage of an early solution, on the ground that if the situation

were allowed to go unsettled until after the expiration of the franchises in 1927, securities of the traction lines would become seriously depreciated in value.

Rapid Transit and Interurban Development in Chicago*

BY BRITTON I. BUDD

President Chicago Rapid Transit Company

THE existing problem in the development of rapid transit and interurban transportation in Chicago and surrounding territory is largely comprised in the augmentation of present facilities. Rapid transit systems for the large cities of the world did not spring full-fledged into existence, but rather are the product or outgrowth of attempts to supply service along certain local routes which, having been later inter-related or joined, constitute the system.

Chicago alone comes nearest to providing the negative to this statement, in that its present system of rapid transit, consisting of elevated lines, was very largely constructed within a period of seven years. Between 1888 and 1895 there were built the South Side, the Chicago & Oak Park and the Metropolitan railways. Subsequently, in 1900, the Northwestern Elevated came into operation, with its Ravenswood branch as a later extension in 1907, while on the south side the Englewood, Stock Yards and Kenwood branches were built in 1906 and 1907. On the west side the Metropolitan Elevated has from time to time increased its length of operated routes on the Garfield Park branch and Douglas Park branch.

The problem in the development of interurban transportation for the larger territory within a radius of 50 to 100 miles from the center of Chicago is comprised in the addition of suitable terminal facilities, by means of which the operation can be brought to the highest degree of usefulness.

The history of those interurban lines in the Chicago territory, having only limited terminal facilities in the urban district, has not been one of large success from the standpoint of usefulness to the population served. The requirements are principally summed up in the outstanding necessity of adequate interconnection with the rapid transit lines of the urban district.

The value of interurban service radiating from Chicago has not been fully realized, nor has this valuable means of intercommunication been encouraged as it has in most cities in the United States.

POINTS OF CONGESTION ON ELEVATED

An understanding of the relative density of travel on the various divisions of the elevated systems can best be obtained by a comparison of the

number of passengers carried per mile of track. The number of passengers carried per mile of single track is now approximately as follows: South Side, 1,102,000; Metropolitan, 864,000; Northwestern, 742,000, and Oak Park, 632,000. The Union Loop has an average of more than 11,000,000 passengers per mile of single track, while the system as a whole averages 1,106,000.

It is possible to state certainly that either subway or elevated lines are capable of average maximum speeds in express service of 20 to 21 miles per hour. The tendency in subway operation, where train movement must be controlled by a complete system of signals, is to increase the length of trains to ten or twelve cars. This has the effect of reducing the number of trains per hour, so that for a traffic loading of 35,000 to 45,000 passengers per mile of single track per hour the corresponding car movement is 360 to 380 cars per hour. This tendency makes itself manifest in the lengthening of the interval between trains.

In elevated movements, express service, the tendency has been to average about seven cars per train for maximum service under the operating conditions that prevail on the structure, where light and sight permit greater ease of movement. The result has been to obtain under maximum service conditions movement of 400 to 420 cars per hour.

TREND OF FUTURE DEVELOPMENTS IN RAPID TRANSIT

So many plans have been put forward for the development of a comprehensive rapid transit system in Chicago that to present another here, giving exact location of streets, lines and routes, would be superfluous. Suffice it to say that rational extension of the system will undoubtedly be carried out by the building of additional lines, one at a time, as necessity and experience suggest and as financial limitations permit.

The general plan of the Chicago Traction and Subway Commission of 1916, or the plan of the All Chicago Council, both are general in character and cover extensive additions to the present system. It is not only difficult but impossible to plan all the actual routes now that may be required in this city within the next twenty or thirty years, but it is generally agreed that the initial step in Chicago should be the building of a rapid transit subway 4 miles in length on State Street, connecting with the South Side Elevated at Eighteenth Street and running thence north to Lincoln Park, thence west on North Avenue to a connection with the Northwestern Elevated Railroad. The extent of a two-track or four-track construction in this subway

*Abstract of paper presented before convocation of Western Society of Engineers, Feb. 6 and 7, 1924, Chicago. In addition to matter printed here, Mr. Budd's paper, intended primarily for local people, included a review of the extent of the present rapid transit system in Chicago, its relation to the present distribution of population, proportion of traffic handled by elevated and surface lines and comparison of traffic with that on Brooklyn railway lines.

can be proportioned according to the general requirements of the situation. This will quickly relieve the existing congestion in the downtown district and prove as well a great benefit to the system as a whole and increase the rapid transit capacity during maximum hours 125 per cent. The initial subway could then be followed as soon as practicable with other short subways through the downtown district, located so as best to serve the situation as a whole.

It has been estimated that the population of Chicago in 1950 will be 5,000,000 people and the local passenger traffic not less than 2,000,000,000 annual rides. This is entirely within the range of probabilities, and it is almost certain that these traffic figures will be exceeded.

RELATION OF SUBWAYS TO RAPID TRANSIT

On account of the prohibitive cost of subway construction, comparatively little of Chicago's rapid transit system should be built as subway mileage. It is true that in the downtown district, where it is vital that the streets be left free for the use of pedestrians and for vehicular traffic and where the Chicago River acts as a barrier which must be passed on two sides of the district, subways for short distances are unavoidable.

It is equally true that with the application of the service-at-cost principle in determination of the future rates of fare on rapid transit lines in this city large additions and extensions to the existing system will have to be installed at a minimum cost. Otherwise, rapid transit in the future will not only be burdened with an excessive fare but the rate of extension of the system itself will be impeded.

The general function of the rapid transit lines should be the movement at maximum speed of mass traffic, especially over the longer transportation routes, where any other means will not suffice. All other means of local transportation within the city can be so related to the rapid transit system as to provide the maximum convenience to the traveling public, especially for distances of comparatively short haul and along routes wherein rapid transit lines may not be provided.

It is not necessary to dwell upon the importance of rapid transit and all other proper forms of local transportation for a city of this size, as that matter will be conceded without contention, but it is important to stress the fact that rapid transit is especially necessary to provide speedy communication not only between the business and residential districts of the city itself but between those districts and the suburban or more remote portions of the corporate area.

In a broader sense the extension of rapid transit to the metropolitan district of Chicago, within a radius of 50 to 100 miles, would mean the development of all suburban and interurban routes within the metropolitan area and the provision of adequate terminal facilities for their operation within the urban district, and especially the relation of those facilities to the rapid transit facilities of the urban district itself.

Development of Chicago Transportation*

Co-ordination of All Transportation Facilities Into Single Operating Unit Urged—North and South Subway for Street Cars Recommended, as Well as Two East and West Street Car Subways Planned Heretofore—Idea Given of Enormous Traffic Handled

BY CHARLES V. WESTON

Consulting Engineer Chicago Surface Lines

EVERY growing community has its transportation problem, which is never finally and permanently solved. It is a continuing problem and is always most acute in major communities where the normal increase in population and riding habit is so rapid that it frequently taxes the ability of the community and its public utility companies to keep abreast of the demands of service.

There are in many instances local conditions which have, in the development of a community, produced constricted, over-populated areas which naturally become transportation terminals or common centers into which a large proportion of all the traffic of the community flows. Ultimately there is created within those areas an intensified congestion which strangles the movement of all classes of vehicular traffic almost to the point of complete stagnation.

The effect of retardation of the movement of street cars, or any scheduled transportation within those over-congested areas, extends to the entire service rendered. Irrespective of however good the service may be as a whole, its effectiveness is generally measured by inconveniences to the public experienced at points where the service is unavoidably at its worst and where, in order to relieve the situation, heroic measures in the way of producing additional facilities must be taken. Undeniably that is the situation which exists in the city of Chicago today in respect to its local transportation.

What is the problem here under discussion? It is first of all a transportation problem in the broadest sense of the word, and it involves co-ordinating all the various transportation facilities, that are susceptible of co-ordination, into a single operating unit so that each element of the whole may perform its function in the most efficient and economical manner, to the end that the riding public may be transported at the lowest cost and in the shortest possible time.

In the long run there is nothing but grief for the public and every one else with two or three competing transportation systems in the same city. The underlying principle of the most effective and economical operation of urban transportation is the establishment of a limited number of long-haul trunk lines served by numerous short-haul collecting and distributing lateral lines provided by a single transportation agency.

The most acute situation in Chicago's transportation problem, requiring attention at the earliest moment possible, is the overcongestion of roadways within the Loop or downtown business district. This Loop District situation

seems to be looked upon by the public generally and by many newspaper writers as being the all-important feature of the traction problem in this city, believing that after relief of some kind becomes effective there the rest will be easy. As a matter of fact, this Loop District problem, although knotty and urgent, constitutes only a relatively small part of the whole problem, because, speaking with particular reference to the Chicago Surface Lines, that utility is serving many important and widely separated business and industrial centers, each of which, having distinctive features, constitutes a special element of the whole problem.

SUGGESTIONS FOR RELIEF

The immediate relief of the Loop District situation will be simple enough if all the interested factors can be brought to work in harmony and an earnest effort is made to do the things that are obviously necessary—namely:

1. Build subways for surface cars to be used for multiple-unit operation when practicable. Two such subways are needed from the west side of the city extending eastward under the Loop District to and under Grant Park.

2. Build north and south subways for surface car operation. If one subway were built in State Street, that part of it from some point well north of the river to a point south of Roosevelt Road should have four tracks, two of which might be assigned to elevated railroad train operation which would afford a much needed opportunity to develop greater use of outlying main-line track capacity. To meet the near future demand for service east of State Street, which is inevitable and will be due to the development of business in the area between State Street and the lake, there should be constructed, for surface car operation, a subway extending from some point south of Roosevelt Road in Indiana Avenue, Michigan Avenue and under Grant Park—connecting with the proposed east and west subways to terminate under Grant Park—and ultimately to be extended northward under the Chicago River and as far north of the river as conditions may demand.

3. Open more through north and south streets by extending Clark Street, La Salle Street and Franklin Street southward as contemplated by the new steam railroad terminal plan.

4. So far as it is practicable to do so, through route north and southbound surface cars.

The surface line subways should extend a considerable distance beyond the present congested business area so that surface cars could be operated through them at high speed, and all surface line riders, to whom the subway service would be available, be given the benefit of rapid movement and saving of time.

If these Loop District suggestions were carried out, the street congestion

*Abstract of paper presented before convocation of Western Society of Engineers, Chicago, Feb. 6 and 7, 1924.

in that district would be materially relieved and street car service would be greatly improved because through greater freedom of movement the available rush-hour capacity of the tracks would be more than doubled.

The most effective urban transportation in large communities may be produced through the development of a limited number of long-haul trunk lines served by numerous short-haul collecting and distributing lines. On the Chicago Surface Lines the universal transfer system in force operates automatically to produce such a trunk line and feeder line system, and if the natural surface trunk lines were provided with suitable facilities and traffic regulations in the congested districts of the city so that free movement of cars, operated where possible and desirable in multiple units, could be accomplished, a long step forward would be taken toward improving the speed, regularity, comfort and safety of street car service. Carrying out the logical ultimate of such a system involves the co-ordination with the surface lines of all present and future rapid transit elevated and subway lines.

MOTOR BUS CO-ORDINATION

The question of extending street railway service into new and undeveloped territory is ever present. There is always a demand upon the street railway companies to project their lines into sparsely populated territory, and reluctance on the part of the companies to build and operate those expensive structures in such localities until they can supply sufficient traffic to provide at least enough revenue approximately to meet bare operating expenses.

It is obvious that the basic transportation service in any community is and will be furnished upon rails. In the development of transportation in outlying, thinly populated districts, it is becoming recognized that the use of trackless service can be as effectively and more economically operated in supplementing the electric railway until sufficient traffic has been developed to warrant the building and operation of a permanent rail structure. A suitable motor bus operated by street railway companies for the development of transportation in new territory is a logical step in the direction of accomplishing the desired result, without incurring the burden of carrying non-productive expenditures of capital by the electric railway system. The use of such a co-ordinated bus system for development of traffic in outlying districts should be authorized and encouraged.

Various plans for improvement of Chicago's transportation system have been made and reports submitted by engineers and commissions. Two notable reports in recent years, both of which give a comprehensive view of the local problem, are the one presented in 1916 by the Chicago Traction and Subway Commission, and another prepared last year by Major R. F. Kelker, Jr., for the local transportation committee of the Chicago City Council.* Any complete study of the local problem should necessitate careful consideration of such reports.

In any transportation study of Chi-

cago the territory served must be considered with relation to the following facts: (1) A central business district approximately 1 mile in diameter; (2) an inner residential district extending out about 5 miles; (3) an outer residential district extending from 5 to 10 miles from the center of the city.

There are also many important outlying industrial districts.

Business centers are widely distributed in Chicago and therefore the riding, during the rush hours, must also be heavy in many districts. While the Loop is commonly discussed as the place in most serious need of relief, yet the zones of heaviest street car loading on lines entering the Loop are more than a mile from the Loop District. On the north side, points of heaviest loading are between Division Street and North Avenue; on the west side between Halsted and Paulina Streets; and on the south side south of Eighteenth Street.

The cars from the entire southern district from Ashland Avenue to the Lake enter the Loop over three streets—Clark Street, State Street and Wabash Avenue. This brings a maximum of 116 cars per hour on Wabash Avenue, 142 cars on State Street and ninety cars on Clark Street; and yet it is a noteworthy fact that at a given point on Western Avenue approximately the same number of passengers are carried as at Van Buren and Clark Streets.

Similar comparisons might be made with other outside lines to indicate that the transportation problem for the Surface Lines is not by any means confined to the Loop District. The total number of passengers carried by surface cars within the Loop area is less than 500,000 per day, while the total carried by the system is over 4,000,000.

The ratio between passengers carried in the middle of the day period and in the heaviest rush period for the various lines forms an interesting comparison of the demand for service. The rush periods, morning and evening, are of short duration; most of the extra cars being of value for one trip only in relieving each rush period.

PASSENGERS PER FIFTEEN-MINUTE PERIOD

Line	Middle of the Day Period	Maximum Evening Rush Period	Ratio of Passengers
Chicago Avenue.	110	1,919	1 to 18
Grand Avenue.	90	1,400	1 to 15
Van Buren Street.	100	1,200	1 to 12
Clare Avenue.	95	2,447	1 to 25
Milwaukee Avenue.	250	3,600	1 to 14
Elston Avenue.	45	800	1 to 18
Combined Loop entrances.	1,280	7,195	1 to 5.6

These conditions, of course, could be materially helped by co-operation on the part of employers to the extent of staggering their opening and closing hours, thus reducing the peak demand and enabling the street railway company to serve the people more adequately at all hours of the day.

If, as has been suggested, all the west side cars were brought through the

Loop to turn at points north or south of the Loop area, and all of the north side cars were taken through to points south of the Loop before turning, while all of the south side cars were taken through to points north of the Loop before turning, the results would be to increase the cars passing over the tracks between Lake and Kinzie Streets from 296 cars in a maximum hour to 777 cars. Those passing over the south side streets south of Van Buren Street would increase from 402 cars per maximum hour to 604 cars. The added cars would be empty in the extra section of travel and would congest the streets to an impossible condition.

Under present conditions, several sections of the city are very serious points of delay and congestion. Grade crossings at many points throughout the city are continuing to disrupt street railway service. These delays from railway crossings create operating conditions that are more serious than the delays due to other street congestion. This will, of course, be improved in time by elevation of steam road tracks. One of the causes for Loop congestion and for congestion along some outside thoroughfares, such as Halsted Street, is due to the very poor condition of the paving outside of the track, and on all north and south streets just west of the Loop area.

There is at present no easy way of getting around the Loop if one wishes to travel from north to south by automobile. If some good traffic routes could be provided on non-railway streets part of the downtown congestion would be immediately relieved.

A great deal of money has been spent in street widening for through boulevards in providing routes for pleasure driving, but relatively little has been done for providing routes for heavy traffic or for providing by-pass routes immediately around the Loop; and less has been done in adjusting street conditions to expedite the movement of street cars in congested areas.

A very valuable form of research to prove what kind of relief for downtown congestion would provide the greatest comfort would be the investigation of the relative interference to traffic flow created by street cars, trucks, horse-drawn vehicles, pleasure cars and buses, in proportion to the number of passengers served. Such information as is now at hand would indicate that the present congestion is caused by a large number of vehicles, each serving a very few passengers, and that the street cars number 10 per cent of the total vehicles while handling 74 per cent of the people riding along the congested streets in the Loop District.

WHAT IS A BILLION?

"Millions" and "billions" are so easy to say and are used with such frequency in financial and industrial transactions that their real magnitude is not always appreciated. When attempting to get a vision of what the Surface Lines' yearly total rides of 1,461,000,000 really means consider this: Since the beginning of the Christian era old Father Time in ticking off the minutes from which the centuries have been built up has scored in 1,923 years a

*Both reports were published in the ELECTRIC RAILWAY JOURNAL at the time issued.

total of 1,011,420,000 minutes—450,000,000 less than the number of Surface Lines' riders transported in one year. For the purpose of accentuating the significance of Surface Lines' figures consider the fact that the Chicago post office prides itself on the handling of 1,298,000,000 pieces of first-class mail last year—an enormous task well done. In that same period the Surface Lines transported 1,461,000,000 riders.

The Illinois Bell Telephone Company reports that nearly 4,000,000 telephone connections are made daily in Chicago. The Surface Lines provided an average of 4,331,000 rides for each day.

At the present time the Surface Lines carry on an average week day 4,331,000 riders, of whom 2,421,000 are cash passengers, 1,786,000 transfer and 124,000 free passengers. The average haul on an individual line varies from 1.5 to 3.5 miles, but with the use of transfers needed to complete the journey of many passengers, the average ride exceeds 4 miles, which is said to be the longest average haul of any surface system in the world.

Taking the total number of revenue passengers on the surface, elevated and bus systems of Chicago last year and adding the transfer and free passengers carried by the Surface Lines, we find a grand total of 1,687,000,000 riders. This gives an average daily travel of 4,622,000 passengers, which might easily approximate 5,000,000 as an average for a week day. This is an enormous figure when it is considered that it excludes the great number of people handled by taxicabs in Chicago, as well as those brought into the city by interurban electric roads and suburban steam roads. The total number of riders carried by the Surface Lines in the last calendar year was 1,461,000,000, which was by far the highest figure in the company's history. The number of separate routes operated by the Surface Lines is 114. The average number of cars now in operation week days is 3,250.

The magnitude of the local street railway system may be judged from the fact that its single-track mileage would form a trunk line from Chicago to Boston, and its daily car mileage would go around the globe sixteen times.

While the other two transportation agencies serving the Chicago district undoubtedly cover an important part of the field, it is interesting to note that for the past year the Surface Lines carried 86.6 per cent of the total passengers and 78.4 per cent of the revenue riders using these facilities. Since the Settlement Ordinances of 1907 were passed, the surface companies have extended the system to 268 miles of single track—an increase of nearly 34 per cent.

The universal transfer system on the Surface Lines is said to be the most extensive in the world, reaching the very high figure of 73 per cent of those paying fare. On all the surface lines a transfer is allowed at practically every intersection, which results in an exchange of passengers at 591 points.

There has been a surprising growth in the riding habit in Chicago during the past year. All local transportation

agencies have felt this. On the surface lines alone revenue passengers increased more than 8 per cent—the revenue rides per capita having jumped from 268 to 285 in 1923—the highest

in the history of the city. A combination of revenue rides on the surface lines and the elevated roads showed a riding habit of 356 as against a peak of 329 ten years ago.

Saving the Small Road*

BY JOHN B. CRAWFORD

Superintendent Concord Electric Railways, Concord, N. H.

ELECTRIC railway lines throughout the country have been suffering and very ill for a long time. Many have given up the ghost and more are threatened. Even in New England the companies that have ceased to function and the miles of track abandoned are appalling. Are all destined to follow the example of their forbears, the stage coach, the canal boat and the horse car? It is predicted that in five years there will be no street cars, except in the larger cities like Boston, New York, Baltimore and Cleveland.

It is not the motor bus but the private automobile that is causing the loss of patronage to the street railways of New England. In the smaller cities, where the cost of living is lower, where nearly every family owns an auto, where people are more generally acquainted and invite their friends to ride and where the parking of cars has not assumed the importance it has in the large city, this competition is real and a question for serious thought.

As a feeder the motor bus has its place and a number of bus manufacturers realize this and are beginning to work with electric railways instead of against them. The public is slowly awakening to the fact that buses and jitneys must be regulated and that it is not a square deal to the street railways to let these pirates come along and skim the cream. When it comes to handling mass transportation safely and expeditiously the motor bus is inadequate, costly and cannot supplant the modern electric car. In such cities as Newark, Des Moines, Bridgeport and others where an attempt has been made to substitute buses for trolleys it has been shown conclusively that the electric car was the most useful method of surface transportation yet devised, and the populace voted to restore the trolleys because the bus proved inadequate and costly.

MORE AGGRESSIVE PUBLICITY NEEDED

Do we not in many cases sit by and let our more aggressive competitors take away the cream of our business? In my view both steam and electric railways are weak in this respect. We don't advertise enough. The manufacturer and the merchant sell their product largely by advertising. We have transportation to sell, but do we use modern selling methods? For instance, in the interior rack space of our street cars we have one of the best advertising mediums in the world, but many of us do not make use of this space for the purpose of telling our story to the public. Instead we lease it by the year to an advertising company which sublets it to national advertisers who appreciate its value as an advertising medium.

*Abstract of a paper before the New England Street Railway Club, Boston, Feb. 7, 1924.

In quite a number of cities the weekly pass has been tried out and has met with instant success. And why? Because of the value of the advertising and publicity campaign which preceded its introduction. I hold no brief for the weekly pass, but I wish the members of this club might hear Walter Jackson give a talk on this subject. It may be that the same amount of thought, preparation and money spent in getting more riders at our present fare would produce more revenue than the weekly pass, but the fact remains that it is being successfully used in thirty-five cities.

Why not get your board of directors to give you an advertising appropriation for 1924? Make it a part of your budget. Offer a prize locally for the best slogan. Get your patrons interested. Give them something to think about while waiting for a car other than that dry curve or that bad joint, and incidentally don't forget to grease that curve and also tell them why you do it. It will soothe their feelings and make friends for your company.

What the public wants is service, and it is generally willing to pay for it if it has a clear understanding of the cost of service. To illustrate this, several years ago we laid out a program of rehabilitation. First, we obtained an increase in fares; then we proceeded to rebuild all cars and trucks one at a time, replacing worn out and obsolete equipment as we went along. We sold our scrap and bought shop tools. Now our cars are kept painted and clean and our train sheets show they are on time nearly 90 per cent of the time. When we first introduced one-man cars we had a public upheaval and the writer came in for a lot of abuse and unfair criticism. However, as soon as the car rider began to realize this was propaganda, and to understand the need for safety cars, the trouble died down as quickly as it had started and for the past two years we have had surprisingly few complaints.

Good public relations are today about the most discussed feature of public service companies. Whenever utility managers meet they will be found discussing ways and means of improving public relations. Such ways and means have two objects in view: First, constantly better service, more courteously rendered; second, constant efforts to get the public to understand the problems as well as the proper functions of the company, and the physical and financial facts of the company's existence. Confidence in the public's sense of fair play and justice when it knows all the facts can be relied upon. As the car riders come to know and understand the facts of the electric railway business, they cease to respond to the demagogue, and also to lose that instinctive antagonism which all of us

have for the things we do not understand.

The Boston Elevated Railway has adopted a new plan to secure the good will of the public, namely, the movie film—a wise move. Perhaps that progressive organization will before long establish a central broadcasting station in order that waiting throngs of passengers may be kept cheerful by being advised by radio of unexpected delays.

Consider the case of the small company whose property is slowly going into the discard for want of patronage and credit. In most cases the discontinuance of such service is not only a great loss to the bond and stockholders, but nearly every person in the community is affected. If an operation is needed why not face the facts and call in the surgeon before it is too late. A drastic reorganization has been the means of restoring a good many steam railroads in the past decade. If our trolley roads need help to continue service, let's go to it. Work out a real constructive plan. Arouse public interest. Appoint a small committee of bondholders, one of stockholders, one of car riders and a committee of employees. Get the chamber of commerce interested and also city officials.

ENLIST AID OF LOCAL CHAMBER OF COMMERCE

Charles M. Bassett in a recent publication, "The Assets of an Ideal City," says: "No institution serves to efficiently in crystallizing public opinion in civic affairs as the modern well-organized chamber of commerce. Its program is based upon a consideration of public needs by a selective group of citizens who are voluntarily associated in the interest of civic progress. This group represents the best thought of the community, those who have ideals and are ready to give their time and money to bring about their realizations."

Here is the meat of the cocoanut. To crystallize public opinion in your favor is what you are trying to bring about, so don't forget your chamber of commerce. When we needed an increase of fare from 6 to 8 cents a few years ago we arranged for a meeting of our chamber of commerce. We laid our cards on the table and told them our troubles. At first opposition arose and many questions were asked, but when the meeting was over we had the good will and active co-operation of a large majority of the members present.

Above all, don't forget to include a committee from the central labor union. This body represents, in a large measure, the views of the car rider, and I have always found its members ready and willing to co-operate and help us when called upon. Having now prepared the ground, the next step is to get all these committees together and functioning.

Some of you may be saying, "It can't be done," "As far apart as the poles," "Too many factions," and so on. Just remember that each of these groups has a personal interest in the plan you are to present. Perhaps the bondholder will agree to scale down his bond or forego interest until earnings can be restored. Perhaps the stockholder will consent to an assessment for the purchase of some new equipment. Even the public in the communities

served may be willing to buy some new stock on the installment plan for the purpose of repairing the track, rather than lose the welcome sound of that old flat wheel. In the Middle West "customer ownership" has been the keynote of the financial strength of the public utilities.

The best place to present your plan is in the dining room of your local hotel after a good dinner. Everyone is now in the proper frame of mind to sit back and listen in all fairness to your proposals, and if outlined by someone with a Matt Brush punch and a few good stories your committee is likely to become filled with enthusiasm and you may be agreeably surprised at the results accomplished.

There is no general panacea for properties that are in a bad way, with earnings constantly decreasing, but it does seem that a number of such lines have been abandoned and the franchises given up without making a last stand. If we don't wait too long some new money may be secured that will enable us to produce gratifying economies.

The growth of our country during the past twenty years has been due in a large measure to the electric railway and it is most important that this valuable industry be maintained and made self-sustaining. In many cases this can be done only by more liberal patronage, and a general campaign to increase this patronage should be planned and carried out during 1924.

Pedestrian Subways with Narrower Surface Sidewalks Would Speed Traffic*

BY T. L. CONDRON AND C. L. POST

The Condron Company, Engineers, Chicago, Ill.

AT PRESENT the great sources of a street congestion that can be relieved are the stopping of vehicles along the curb lines to load and unload and the confusion at the street intersections caused by pedestrians crossing the traffic lines. The stopping of vehicles along the curb, even though for brief intervals, immediately interrupts a possible lane of traffic and reduces the traffic width of the thoroughfare. In general, the width of the downtown streets in Chicago is such that there is space for two lines of street cars and four lines of other vehicles. When the latter stop alongside the curbs, as is the normal situation, the number of lines of moving vehicles becomes two instead of four. Consequently, if there is a way to afford additional space in which vehicles may stop to load and unload, the number of lines of moving vehicles can be increased to four. This desirable result can be attained by reducing the width of surface sidewalks and building subways for pedestrians.

Room for such sidewalk subways is already in existence in the downtown district on many streets, as the space beneath the surface sidewalks is utilized in connection with the abutting buildings. The streets have been dedicated to the public for highway purposes, and, therefore, the space beneath the sidewalks is at all times available for the use of the public, although in general revocable permission has been granted to the abutting property owners to use this sub-sidewalk space as extensions to their basements.

The block bounded by Jackson Boulevard, Van Buren Street, Dearborn Street and State Street has been selected as an example involving all the different conditions affecting the downtown streets. Supports for the elevated railway obstruct the sidewalk lines of Van Buren Street, street car tracks occupy State Street and Dearborn Street, while Jackson Boulevard is free from surface cars as well as elevated structures, and Plymouth Court is a non-continuous street. The surface sidewalks on the streets surrounding

this block would be narrowed by setting back the curbs 7 ft. on each side, thus reducing the width of the sidewalks from approximately 15 ft. to 8 ft., except at street intersections, and giving room for vehicles to stop alongside of the curbs without interfering with the main traffic lines. This would increase the capacity of the streets for moving vehicles other than street cars 100 per cent. At the corners stairways would be provided leading to the sidewalk subways. Stairways might also be built from the subways to the loading zones for street cars.

The use of the surface sidewalks along each block would be restricted to those passing along that block to enter or leave the adjacent buildings, and for movements of pedestrians and packages from standing vehicles to the buildings. Pedestrians would not cross the street intersections at the ground level, but only in the subways and not be interfered with by vehicular traffic. The sidewalks in these subways would have practically the same width as the present surface sidewalks, thereby actually increasing the sidewalk capacity at least 50 per cent.

The principal feature of new construction involved would be the building of sections of this subway at the street intersections, and as these portions of the subway would have the same width as the subways under the sidewalks, the construction would be simple and relatively inexpensive. They would in no way interfere with any future traffic subways, as the traffic subways would of necessity be at a lower level at the street intersections, and such traffic subways would not be wider than the distance between the present curb lines except at the stations, which would readily be reached from the proposed sidewalk subways.

The sidewalk subways would be raised at intersections with general utilities such as sewers, water and gas mains, and electric conduits, in order to involve the minimum of interference, especially with the sewers, which of necessity are at considerable depth below the street level and should be maintained at or near their present depths.

*Abstract of a paper presented before annual convocation Western Society of Engineers, Chicago, Feb. 6 and 7.

Maintenance of Equipment

Portable Stand Lamp for Car Repairs

By P. V. C. SEE

Superintendent of Equipment, Northern Ohio Traction & Light Company, Akron.

A HOME-MADE type of adjustable lamp stand that has been found very useful for all kinds of work in the shops of the Northern Ohio Traction & Light Company is shown in the accompanying illustration.

In the position at the right the light may be used in connection with the painting of car ceilings or any overhead work. In the center position light is thrown on the work, either at benches or on trucks, while in the position at the left it is thrown on the side of the car for any carpenter body work that requires attention.

This device is made with a base casting somewhat resembling an ordinary traffic signal stand, threaded for 1-in. pipe. At a distance of 4 ft. from the ground, a round conduit box is screwed on the end of the pipe. A curved piece of pipe is fitted into another round conduit, the two being fastened back to back by a screw with a wing nut. The

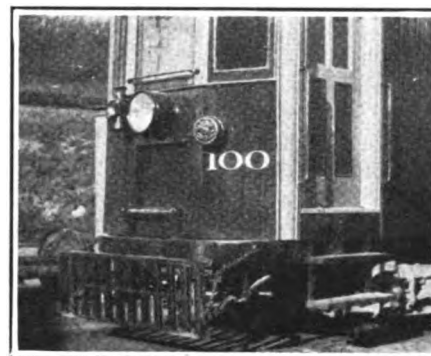
wires are run through the pipe and into a socket to which a reflector is fastened, thus making a neat finished job.

Lamps of this type are found much more convenient than the usual form of drop light.

Line Car Built to Carry Long Poles

THE Valley Railways, Lemoyne, Pa., has recently completed the rebuilding of a line car. This car was built in 1908 and was equipped for two-motor operation. In December, 1923, it was remodeled for four-motor operation and airbrake equipment was installed.

An interesting feature of the car is an arrangement of openings in the dashboards, to permit long poles carried on the floor of the car to project at both ends. The openings are 24 in. square and underneath a roller has been constructed by means of simple brackets and iron pipe. The pole is rolled into position on this roller and carried by the car to wherever it is needed and then easily rolled off again. The car itself is 35 ft. long and carries 50-ft. poles



Hole in Line Car Dash Permits of Carrying Pole

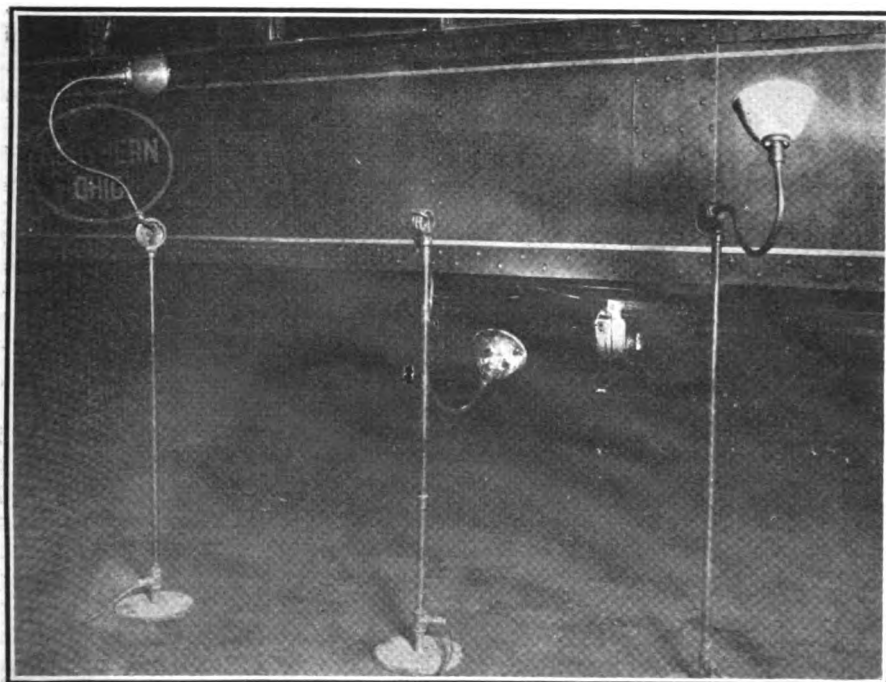
without difficulty. On account of the fact that much of the line of the Valley Railways is on private right of way this method of carrying poles has been a great convenience.

Feeder Wires Reinsulated at Small Cost

AN EXPERIMENT recently made by the Union Street Railway, New Bedford, Mass., with the use of rubber tape to reinsulate feeder wires has proved so successful that it is planned to extend the practice. Three feeder cables, one of 500,000 circ.mil and two of 300,000 circ.mil, which had been installed about twenty years ago had become almost bare of insulation in places. This was a rather dangerous condition because the feeders were carried on iron poles with iron cross arms.

It was found upon investigation that the copper in these feeders was as good as ever and on account of the high price of wire the railway wished to avoid buying entirely new cables. The old wires therefore were recovered with one layer of 2-in. rubber tape and two layers of 2-in. cotton tape. This was done during the summer months and the heat of the sun soon melted the wrappings into a homogeneous mass.

The job was done by the line crew during spare time and it is estimated by the company that the cost of reinsulating the old feeders was less than 10 per cent of what new feeders would have cost. It is felt that they are now in almost as good condition as when they were new.



This Portable Lamp Stand Is Adjustable for a Wide Range of Work

Simple Wheel Stops Are Effective

THE Pacific Electric Railway, Los Angeles, has standardized in three classes of wheel stops. The simplest type is for wheel storage tracks at the company's shops. For this purpose a bumper made of two cast-iron plates bolted together above the rail has proved satisfactory. The stop extends about 5 in. above the head of the rail, and since it is not bolted through the web it may easily be adjusted and fastened in any desired location.

In yards where passenger cars are stored at the various terminals, a slightly larger wheel stop is used. This consists of two plates fastened together above the rail with a single bolt and through the web of the rail with three bolts, as shown in the accompanying illustration and sketch No. 4.

A still larger wheel stop has been adopted for use on industrial spurs and public team tracks. Two iron

castings, each roughly triangular in shape and weighing about 70 lb., are bolted together with one side of the triangle vertical and one side along the rail.

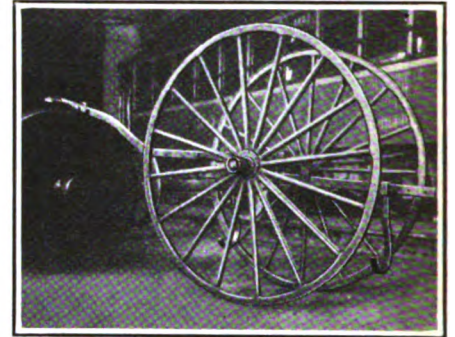
The length along the rail is 27 in., and the height is 19½ in. Including the time spent in drilling the rail and adjusting the location of the castings, it requires two laborers a full nine-hour working day to install a set of these bumpers in position.

All of these wheel stops possess the advantages that they are very inexpensive to install, occupy a minimum of space in the storage yard, and serve their intended purpose satisfactorily.

Carriage for Moving Armatures

ON PROPERTIES where the armatures are removed from the motors in the carhouse, and must be transported to the shop armature room for repairs, a carriage of

simple construction, such as is used by the Chicago & Joliet Electric Railway, is convenient. In this device a frame is mounted on an axle between two wooden carriage wheels of 4 ft. diameter set to 24-in. gage. The principal member of the frame is a steel bar 5 ft. long, of ½-in. x 1½-in. section, fastened directly to the axle

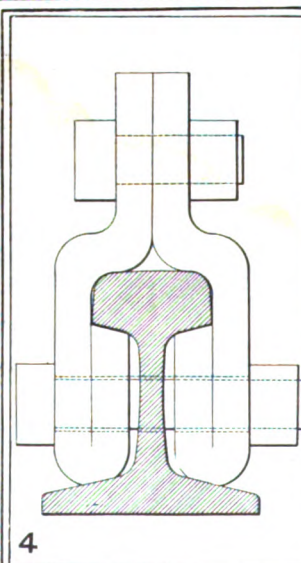
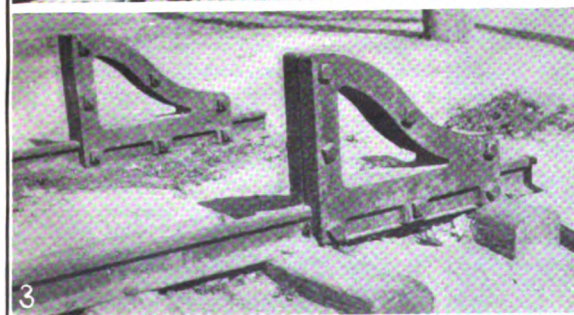
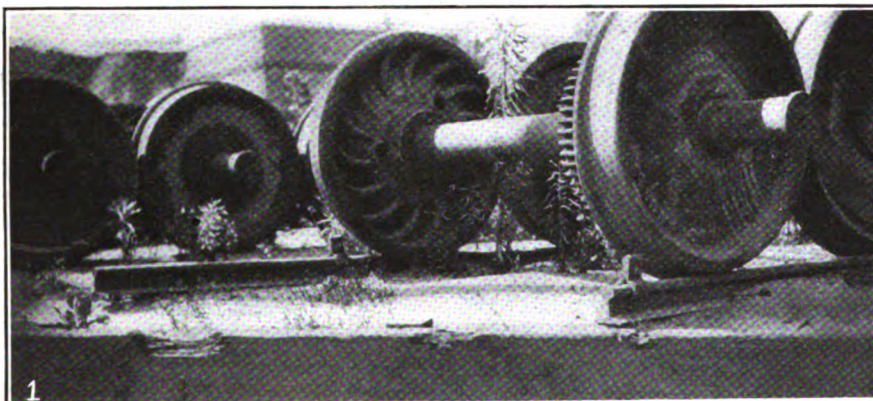


This Narrow-Gauge High-Wheeled Armature Carriage Is Used in Shops at Joliet

and braced by diagonal members. One end of the bar is bent up to form a handle for moving the carriage. The other projects about 6 in. beyond the axle. From this a yoke bar is carried by a permanently fastened 3-in. link of 1½-in. x ½-in. material, which supports the yoke at its center below the axle, so that the yoke is free to swing vertically about the point of support. A second link on the opposite side of the axle with a removable pin also connects the yoke to the main bar above. This prevents the armature from swinging while the carriage is being moved. This link can be disconnected and the yoke dropped for picking up an armature. Two hooks held in position by removable pins are mounted on the yoke for engaging an armature shaft. Adjustment for various lengths of armatures is made possible by a number of holes in the yoke.

In operation, the carriage is tilted up so as to engage one end of an armature shaft with the forward hook; then, after removing the pin in the rear link, the other end of the shaft is engaged with the second hook.

The handle of the carriage is then lowered to a point where the pin may again be inserted in the link. Lifting the handle raises the armature free from the ground. The narrow gage and the large wheels are employed in order that the carriage may be moved easily between the cars as they are berthed in the carhouse.



Simple Wheel Stops Used by the Pacific Electric Railway

No. 1. Adjustable clamp for wheel storage tracks. No. 2. A larger clamp is used in passenger terminal yards. No. 3. This bumper is useful on industrial spur track.

No. 4. Three bolts pass through the web of the rail and one bolt holds the upper parts of the two steel plates firmly together.

The News of the Industry

Akron's Mayor Loses

Still Says City Shall Ride on Rubber, but Council Votes Down Bus Operating Grant

Mayor D. C. Rybolt of Akron, on Feb. 19, had his first real defeat since electric railway service was discontinued on Feb. 1, for the Council refused, by one vote, to pass the pending bus franchise as an emergency measure. Eight votes were required. The franchise received only seven.

Not only this, but following the efforts of the Mayor to foist upon the city a ten-year bus franchise embodying practically the same provisions as the emergency measure, the Council in special session on the afternoon of Feb. 20 killed the proposal. The action followed an address by Councilman E. L. Martin, who tore the legislation to pieces and drove the administration to abandon the franchise. Hundreds filled the Council chamber and cheered the speaker. A plea by Councilman Rose for the return of the street cars won applause from the gallery.

BUSES OPERATE WITH DIFFICULTY

The bus franchise that was proposed is a broad one, providing fares ranging from 5 to 10 cents. For a single ride without transfer privilege there was to be a straight fare of 5 cents. By purchasing tickets at the rate of five for 30 cents, the rider could obtain a free transfer. In addition, "Limited" buses are provided from one section of the city to another at a 10-cent fare, with free transfer. And a 5-cent fare patron on a local bus was to have the privilege of transferring to a limited bus by paying another nickel.

The franchise—or rather franchises, for there were two, one a temporary and the other a permanent franchise—provided that the Akron Transportation Company, a newly organized bus company of which little is known regarding its real backers, should invest not less than \$100,000 in "modern motor buses" and that it should be "unencumbered," but in case it was not "unencumbered" the company should file a liability insurance policy for \$100,000 "to protect the interests of the public." The streets upon which the company was to operate were named. These streets included thoroughfares upon which independent motor buses and jitneys have been operating for years. Under the temporary franchise, which it was intended should be in effect until May 1, 1924, the present operators were given until the close of the present year to retire from the field, but could continue for a short period longer at the option of the Mayor.

While the permanent franchise was to run for ten years, there was to be a fare adjustment at the end of the first year, by arbitration, if necessary and at the end of each two-year period thereafter in a like manner. The third arbitrator was to be named by the probate judge of Summit County in case a company arbitrator and a city arbitrator could not agree.

When the members of the Council were presented copies of the franchise on Tuesday afternoon, and an effort made to "railroad" the grant through, four members entered vigorous protest. They pointed out that an attempt was being made to "rubberize" Akron by "ramming a franchise down the throats of the people for a 10-cent fare." The Mayor made a long plea for the passage of the franchise, urging immediate action so that "motorization of the city may become real." He admitted that the present service and equipment were wholly inadequate to care for the people, but insisted that if the franchise was granted it would result in Akron securing "the finest transportation system in the world within a short time." The Mayor refused to say who was behind the new bus company, asserting that the "men were responsible." Councilman Rose said he had been given to understand that Mr. Firestone and others were behind the project. During the last ten days Mr. Firestone has said repeatedly that he "would have nothing to do with the financing of a bus company." Another meeting of the Council was called for Wednesday afternoon. It was at this meeting, as previously related, that the proposed grant was defeated.

RELIEF BEING SOUGHT

Transportation in Akron during the week commencing Feb. 16 has been worse than at any time since the street cars ceased running. Wednesday night, following a sleet storm during the afternoon, the situation was particularly bad and the seventy-two buses which have been brought from the outside were wholly inadequate to care for the crowds. Councilman Rose declared it took more than an hour to get the workers away from the Goodyear plant and that thousands walked. Similar conditions prevailed at the other rubber plants with the exception of the Firestone, where more than thirty buses were sent to care for the workers.

Many persons are still appealing to the city for relief, but the Mayor announces that "the inconveniences now suffered will be more than offset by the service that will be supplied later." "Akron must, and shall," he declares, "ride on rubber."

Business conditions are still bad.

Merchants openly complain that women shoppers are not coming downtown. The usual sales for February have been abandoned.

Home Rule Hearing Set

Discussion of Measure to Help New York City Administration Will Include Referendum Rights

The final public hearing, before introduction in the Legislature, on the home rule enabling act will be held in the city of New York, at the City Hall, on Feb. 25. The hearing held at Albany on Jan. 30 brought forth a request for a more specific enumeration in the enabling act of just what the local legislative body of a city might do and what it might not do under the provisions of the home rule amendment to the Constitution approved by the people last November, and also a clear statement of the class and kind of questions which must be submitted to the people for their approval by the board of aldermen or local legislative body.

The first draft of the enabling act gave certain regulatory powers to cities over public service corporations and implied that a city having the right under its charter or by existing law to own and operate a public utility might do so and might create a debt of the city for such purpose without referendum to the people.

POPULAR REFERENDUM PROVIDED

In the revised draft this same authority remains, but under a new section fifteen added to the enabling act on "Mandatory Referendums," it is provided that any local law which changes a provision of law relating to public utility franchises must be submitted to the people for approval by them.

Subdivision five of Sec. 12 of the enabling act, under supplemental powers of cities, reads:

"5. To adopt a local law repealing a local law or state statute, which, pursuant to this chapter, it is authorized to adopt or amend."

This language appears to afford an avenue through which the question of jurisdiction of regulation of public utilities by the State, through the Public Service Commission, and by the various cities, each after its own manner and method by means of local ordinance, might become very much mixed. Aside from this the mandatory submission of ordinances changing a local franchise condition of a public utility corporation to a referendum of the people threatens to make such bodies the football of local politics, commentators say.

Injunction Secured Against Dayton's One-Man Car Order

Protected by a temporary injunction which prohibits the city from ordering them off the streets, one-man street cars still are operating in Dayton, Ohio. Four companies have entered the fight to keep the one-man cars in operation. Arguments on the case will be heard in the near future. Meanwhile the one-man cars will be permitted to continue. The cars were ordered off the streets by a referendum of Dayton voters last fall after protest had been made against them. The ordinance passed by the City Commission in conformity with the referendum was to have become effective on Jan. 1.

Members of the local street railway men's union at Springfield, Ohio, in a letter to Mayor William Argabright are protesting the adoption by the City Commission there of any measure providing for the use of one-man cars. The men protested the adoption of the one-man car on the theory that it is difficult to operate them and that they constitute a menace to the public.

Resolution to Abrogate Phoenix Franchise Tabled

In deference to the opinion expressed by the spokesmen for several city organizations the City Commission of Phoenix, Ariz., has tabled its resolution directing the city attorney to take steps to abrogate the franchise of the Phoenix Railway for alleged failure to comply with the terms of the franchise. Mayor Whitney voiced the sentiments of the Commission as being in favor of procuring an engineer to examine the situation and report as to the best means of rehabilitating the system, this report to be digested by the city officials and a committee of citizens named from the various civic organizations from which it is hoped some definite plan for improving the railway situation may be worked out.

Some time ago a committee of citizens appointed by the Mayor to investigate the matter recommended municipal ownership with private operation.

The whole matter arose over the question of paving. The company contends that it has no money to do this work. S. H. Mitchell, manager, says that the system is not paying and has in fact never paid any dividends to its owners. The company operates at a 5-cent fare.

New York City Administration Measure Appears in Legislature

A second Democratic transit bill was introduced in the New York State Legislature on Feb. 20 by Senator Walker and Assemblyman Bloch, administration leaders in their respective houses. It gives cities the right to own, establish, construct, acquire and operate municipal bus and trackless trolley lines at a statutory 5-cent fare. The new measure follows the terms and provisions of the "city home rule transit" bill introduced on Feb. 19, the second piece of Hylan legislation. The Democrats introduced the bill chiefly to take care of the existing bus and trackless trolley lines to the best advantage from the Hylan municipal ownership standpoint. The city home rule transportation bill, the bus bill and any other transit measures that may be introduced by the Democrats are expected to pass the Senate. When they reach the Assembly, however, it seems likely they will be referred to a committee, where they will stay until a compromise is reached.

Detroit's Articulated Unit in Service

Detroit's three-unit articulated train arrived in that city on Wednesday night. It had been run on its own power overland from Cincinnati and carried sixty railway men interested in its operation.

On the trip it encountered rain, sleet and snow. The test to which it was put was very severe, but the vestibules proved to be weathertight. The riding qualities of the unit were excellent. It took perfectly the severe breaks in grade and the curves. There were no mishaps. The train was put into service in Detroit on Thursday morning.

Franchise in Niagara Falls, Ont., Approved

After hearings covering a period of almost three weeks, the City Council of Niagara Falls, Ont., has approved the franchise to be granted the Canadian National Railways, the Canadian government-owned system, for the operation of local lines in Niagara Falls, Ont.

The only point over which there had been a prolonged debate was the exemption from local taxation asked by the Canadian National Railways. It was agreed that the company would pay a fixed rate of \$20,000 annually for fifteen years, the period of the franchise. The franchise now must go before the Provincial Legislature of Ontario and also must be ratified by a vote of the taxpayers. The special election to vote on the matter will be held late in March.

It was agreed that the Canadian National should charge an initial fare of 7 cents. All future rates of fare will be based upon the service-at-cost provision in the franchise. The City Council wanted a 6-cent fare at the start.

Arbitration in Des Moines

Failure to reach an agreement between the officials of the Des Moines City Railway, Des Moines, Iowa, and its trainmen over the question of the men's demand for an increase in wage scales and working conditions has resulted in each party to the controversy appointing arbiters to settle the disagreement. During the past week the company announced that W. C. Harbach would represent it in the arbitration proceedings and the men named Rev. F. W. Mutchler. Mr. Harbach has been a prominent manufacturer and capitalist in Des Moines for many years. Rev. Mutchler is at present pastor of Union Park Church of Christ in Des Moines. They will name the third arbiter shortly. In the past it has been the custom of the company to name its attorney, while the men chose their business agent.

Unfortunate Wreck on Indiana Union Traction Company's Line on Feb. 2



Flashlight of Anderson-Bound Car, Showing Car Destroyed Except for Trucks



Time Exposure Taken by Light from Burning Indianapolis-Bound Car

Operation Under Loss Not Compulsory

A railroad corporation cannot be compelled to continue operations at a loss under a permissive charter and cannot be prevented from selling its tracks and other physical assets as salvage, the United States Supreme Court held Feb. 18 in sustaining the ruling of the lower courts in the suit of the State of Texas against the Eastern Texas Railroad Company, a steam property. The company, operating a short line built primarily to serve lumber mills, gave notice of suspension and of intention to abandon its line and sell its assets when revenue fell off heavily due to closing of the mills because of exhaustion of the timber supply, nearly all of its traffic being lumber. Permission was granted by the Interstate Commerce Commission. The State of Texas resisted, the line being wholly intrastate.

Tentative Stockton Franchise Expected to Be Ready Soon

Progress is reported in the preparation of the blanket franchise application to be submitted to the City Council by the Stockton Electric Railway, Stockton, Cal.

Frank W. Webster, general manager of the company, has submitted a tentative draft to the legal department of the company and this document is in course of preparation for final submission.

The situation in Stockton is said to be similar to that with which Fresno was confronted until recently. Fresno has granted the Fresno Traction Company a blanket franchise covering a long term and under this franchise several extensions have been made. Stockton residents have urged extensions, but these have been declared impossible under the existing franchises.

The Stockton Electric Railway now holds several franchises, each expiring at different times, the longest term expiring seventeen years hence. The company hopes to secure a blanket franchise covering all its lines for a uniform period.

The railway systems in both Fresno and Stockton are controlled by the same interests.

Hearing on Philadelphia Subway Proposals on Feb. 29

The Public Service Commission of Pennsylvania has fixed Feb. 29 for the hearings on the petitions of the city of Philadelphia for certificates of public convenience for the proposed high-speed lines under step No. 1 of the transit plans. The system with which the hearing will concern itself will consist of subways under Broad Street, Ridge Avenue, Walnut Street, Chestnut and Forty-second Street; and elevated railway from Forty-second Street to the City Line on Woodland Avenue, and a bridge over the Schuylkill River to connect with the Chestnut-Walnut Street subway. There will also be considered the surface car subway on Chestnut Street between the two rivers and to

Franklin Square by way of Sixth or Seventh Street, which the Philadelphia Rapid Transit Company interests require the city to build.

International Employees' Trial Postponed

The trial of other striking platform employees of the International Railway, Buffalo, and local officials of the Amalgamated Association on charges of conspiracy in connection with the dynamiting of the Buffalo-Niagara Falls high-speed line at Ellwood Station in August, 1922, when more than sixty tourists were injured, has been postponed by United States District Attorney William J. Donovan until after the United States Circuit Court of Appeals hands down its decision on the appeal of the four strikers who already have been convicted and sentenced in Federal court.

It may take at least three months for the United States Circuit Court of Appeals to pass upon the appeal of Francis Reilly, Healey Breeze, William H. Smith and William L. Vandell. Wrists of error were obtained by counsel for the prisoners so an appeal could be taken. Maximum sentences under the law for conspiracy were imposed on these strikers.

Another Boston Subway Station Suggested

It is proposed to build one more station in the Boston subway system, at a cost of about \$600,000. This is to be located in the Cambridge tunnel at the point where it passes Charles Street, which is a populous center of the West End, close to the Massachusetts General Hospital and other institutions. It is generally agreed that this section has not been adequately connected with the Boston rapid transit system. The proposition is now before the Massachusetts Legislature. The trustees of the Boston Elevated want the \$20,000 to \$30,000 a year cost of operating the station assessed against taxpayers.



News Notes

United Railways Pays by Check.—The pay car of the United Railways, St. Louis, has been sidetracked. In the future employees of the company will be paid by check instead of in cash. It is said that the new plan lightens the work of the paymaster's department. In addition it removes the hazard always inherent in the transportation of considerable sums of money.

No Construction While in Receiver's Hands.—Although there may be great need for extension of various branches of the United Railways, St. Louis, due to the increase in the city's population, Judge Faris of the United States Court for the Eastern District of Missouri has held that the court has no authority to order the construction of exten-

sions while the system is in the hands of a receiver appointed by the court. This ruling, an oral one, was handed down by Judge Faris in passing on the application of the city of St. Louis, the North St. Louis Business Men's Association and the Natural Bridge Industrial District Association for leave to intervene in the United Railways litigation and ask the court to order construction of the needed construction.

Agreement Reached.—The Tiffin & Fostoria Railway has accepted the offer of the city of Tiffin, Ohio, which provides that the company remove its tracks from Washington Street and relinquish its franchise rights on the street. In return the company is to be freed of all paving costs.

Veterans in Dallas Honored.—Fifty-four veteran employees of the Dallas, Tex. Railway were honor guests at the Chamber of Commerce honor banquet to the "twenty-year men" in Dallas. This banquet given by the Dallas Chamber of Commerce was planned to honor those employees in Dallas who had remained in the service of one company for twenty years or longer, and several hundred veteran employees of various commercial enterprises, business houses, etc., were guests at this banquet. The Dallas Railway led the list of employers having the greatest number of twenty-year men to attend the banquet. D. L. Wilson, now retired on a pension, topped the list with a continuous record of service dating from April 29, 1887. Before going to the banquet the veterans posed for a group picture. At the banquet, held at the Oriental Hotel, Joe Cook, a veteran operator from the days of the mule cars in Dallas, wore clothes typical of the mule-car days, and around his neck was looped a big black snake whip, such as drivers of the old mule cars used.

Attorney Chosen.—The Tennessee Railroad & Public Utilities Commission recently named Horace B. Stout as its permanent attorney to succeed Roberts & Copper. The latter firm is retained in an advisory capacity.

Women's Committee Formed.—A women's committee on public utility information has been organized in Wisconsin to assist companies in forming its women into study classes and in providing general lectures dealing with the problems of the utility business. In addition the committee will suggest general plans whereby the women can make themselves more useful in connection with the efforts of the companies to provide courteous and efficient service to the public. The work of the committee will be carried on under the auspices of the Wisconsin Utilities Association.

Very Active in 1923.—In the year 1923 the Ontario Safety League distributed among manufacturers, motorists, railway men and other groups seeking co-operation in the reduction of accidents, 66,600 industrial bulletins, 225,000 motorists' cards and many circulars, reports, calendars and safety buttons, all in the interest of safety first. In addition the league distributed a little more than \$600 in cash prizes in cartoon and essay contests.

Foreign News

Holland Uses One-Man Cars

During the past year several cities in Holland have adopted the one-man system on all or some of their cars. Arnhem included all its lines in the system and Utrecht began with one of its lines. Amsterdam has two lines with one-man cars. The object in each case was to economize.

In Amsterdam the result has been sufficiently satisfactory to cause preparations for the extension of the system. This will be effected by gradually changing the cars now in use, at an average cost of 115,000 francs (\$2,000) per car. Experience with the one-man system in Amsterdam indicates that the saving in labor costs will more than pay for changing the cars. The payment of the personnel is 80 per cent of the maintenance and operation cost.

So far as one-man cars have already been substituted for two-men cars, no reduction in the number of passengers is reported. In fact, there is apparently an increase, though probably due to the public curiosity. Entrance is at the front and departure at the back of the car—the latter through a turnstile to prevent crowding and pushing against the door. A distinct improvement is that the doors are opened and closed only when the cars are standing, thus avoiding the many accidents, sometimes fatal, caused by people jumping on or off the two-man cars while they are in motion. In one respect the new cars are sometimes inconvenient, as no change is given by the driver-conductor and the exact fare (10 Dutch cents, 4 American) must be produced in a silver coin before a passenger is admitted.

It is hoped that the economy effected by the one-man plan will restore the street car system to its former profit-earning condition. There was a loss equivalent to about \$30,000 in the year 1922, caused by reducing the fare from 15 to 10 Dutch cents (6 to 4 American).

Trackless Trolley Versus Tramway

The comparative costs of reconstructing the tramway tracks in that city and of substituting the trackless trolley are given in a report by R. H. Wilkinson, general manager Bradford Corporation Tramways. Mr. Wilkinson favors the change on certain routes, because of present high cost of reconstruction of worn-out track. He, however, refers to the liability of buses skidding on steep gradients, and says that experience alone can convince him that railless vehicles can be as safely worked in such places as tramway cars.

The expenditure for converting the Bradford tramways to the trackless system would be about £603,000. This comprises return feeders for 51 route-miles, £128,000; overhead line for same distance, £93,000; reinstatement of roads, £382,000. Nothing is included for cars. The cost would be spread over fifteen years. If tramways are continued the cost of maintaining and

renewing the permanent way would be £70,000 a year, or £1,050,000 in fifteen years. Against this, on the railless side, an annual tax would have to be paid for road maintenance amounting to £70 per vehicle, which for 270 buses amounts to £18,900. On this heading there would thus be an annual saving of £51,100.

No comparison was given of the costs of operation with the two systems.

Trolley Cars on the Vienna Stadtbahn

The Vienna Municipal Tramways will equip with trolley wires the Stadt and Ring Bahn of that city and operate it with trolley cars. This line forms two belts around the city and was originally part of the government steam railroad line, but owing to the high cost of fuel its service was abandoned following the war. The length to be equipped is 16½ miles, with twenty-five stations. As the formerly used steam railroad cars were 3 m. wide and the street cars only 2.2 m. wide, the station platforms will have to be extended and they will be raised in height at the same time to be flush with the car entrances. The standard type of surface motor car with one or two trailers will be used. The overhead line will be of catenary construction at 600 volts, but insulated for a possible increase in voltage later to 2,000 volts. Five substations equipped with mercury arc electrifiers will be built to supply direct current.

Automatic Substation in London.

One of the first automatic substations in England is being installed by the London Electric Railway for the extension of the Charing Cross & Hampstead line from Golder's Green to Edgware, now under construction. This station, located at a point called Burnt Oak, will have two 1,200-kw. transformers and synchronous converters for changing the incoming 11,000-volt three-phase current from the Chelsea power house to 600-volt direct current for the conductor rails. The converters will be started or stopped by a switch at the Golder's Green depot, some 3 miles away, and there also will be the instruments showing the load on each section of line fed from the substation.

American Locomotives Arrive at Bordeaux.—The French press has hailed with enthusiasm the arrival at Bordeaux of the first of the gearless electric locomotives built at Schenectady by the General Electric Company for the Paris-Orleans Railway. The trials held at Erie, which gave a high speed of something like 170 km. an hour, have made a most optimistic impression as to the possibilities of improving the service on this one of the most important of the seven great French trunk lines. The first trials in France will be over a portion of the line with but 600 volts on the contact line. The final trials will be held between Paris

and Vierzon, where the line carries 1,500 volts. It is stated that if the model is adopted others will be constructed in France by the consortium of firms which makes up the Société d'Études pour l'Électrification des Chemins de Fer Français.

End of the Glasgow Subway Company.—The directors of the Glasgow Subway Railway have issued their final statement of accounts as of Aug. 1, 1923. On that date, as previously reported, the undertaking passed by purchase into the hands of Glasgow Town Council. With the exception of the secretary, all the staff have been taken over by the Council, and the directors propose to pay the secretary £3,500 as compensation for loss of office. The company's assets permit of a payment to the preference shareholders of 16s. 1d. per share and to the ordinary shareholders of 10s. 8d. per share.

Tickets Reduce Revenue.—It was intimated at a recent meeting of the Halifax, England, tramways committee that by the use of books of fourteen penny tickets for 1s. about £70 a week was being lost. When the concession was made last October it was hoped that it would lead to increased travel. A large number of books had been sold, but these apparently had been purchased by regular users of the cars.

Tram and Bus Insurance Rates Discussed.—At a town meeting to consider the promotion of a Parliamentary bill by the town council of Hull, England, authorizing tramway extensions among other things, the chairman of the tramways committee said that tramcars were safer than buses. To insure a bus carrying fifty-five passengers against accident cost £40, while to insure a tramcar carrying eighty passengers cost £4.

Light Signals on Edgware Extension.—The extension of the Charing Cross & Hampstead line of the London Electric Railway from Golder's Green to Edgware is being equipped with two-position color light signals, though little of the line is in tunnels. Semaphore arms are dispensed with, as the lights have a range of about 2,000 ft. even in bright sunshine. The lamps are fitted with lenses of 8 in. diameter, which project bright colored beams of light. The signaling is done automatically by means of track circuits in the same way as on the underground railways. Signals of this kind have been in successful use on the part of the railway from Golder's Green to Hendon which was opened for traffic last November. An all-electric system of point control and of train stops is being installed. Instead of detonators for foggy weather, fog repeaters are being fixed about 300 ft. in front of each colored light signal. The repeater is fixed on a post and throws out a powerful light on a level with the motor-man's eye.

Metropolitan Railway Dividend.—The directors of the Metropolitan Railway, London, England, have declared a dividend at the rate of 5 per cent per annum for the second half of last year, making 4 per cent for the year, as compared with 3½ per cent for the previous year. £15,000 is placed to reserve and £35,000 carried forward.

Financial and Corporate

Revenue Passengers Decreasing

Washington Property Confronted with Curtailement of Governmental Work and Increased Use of Automobile

The balance of income for 1923 credited to profit and loss by the Washington Railway & Electric Company, Washington, D. C., was \$151,327. To this there were added miscellaneous items of \$136,578, largely profit from the sale of real estate, so that the total credit to profit and loss for the year was \$287,906.

William F. Ham, president of the company, explained at the recent annual meeting of the stockholders that aside from dividends from the Potomac Electric Power Company included in the operating statement of the company, no income was received by the company on its investment in stocks of subsidiary companies. The regular dividend on the preferred stock, at the rate of 5 per cent per annum, was continued throughout the year, and on June 1, after a lapse of four years, payment of dividends on the common stock was resumed, three dividends of 1½ per cent each having been paid during the year.

CONDENSED STATEMENT OF WASHINGTON RAILWAY & ELECTRIC COMPANY FOR YEAR 1923

Gross earnings from operation.....	\$4,957,214	
Miscellaneous income (including dividends from Potomac Electric Power Company).....	707,758	
Gross income.....		\$5,664,972
Operating expenses (including depreciation), taxes and miscellaneous charges.....	\$4,089,016	
Interest on funded and unfunded debt.....	755,878	
Payment of dividend on 5 per cent preferred stock.....	425,000	
Payment of dividend on common stock (3½ per cent).....	243,750	
		5,513,644
Balance of income for year 1923, credited to profit and loss.....	\$151,328	
Miscellaneous items (largely profit resulting from sale of real estate) credited to profit and loss during the year 1923.....	136,578	
Total credited to profit and loss during the year 1923.....		\$287,906

Mr. Ham explained that due primarily to the reduction of governmental activities since the war and to the greatly increased number of automobiles in use travel has been falling off almost constantly since the spring of 1920. Comparative figures follow:

	Revenue Passengers Carried	Number of Automobiles
1919.....	91,488,735	44,631
1920.....	87,782,784	56,148
1921.....	85,481,656	63,610
1922.....	82,716,756	79,546
1923.....	81,518,607	101,543

Thus the decrease in pay passengers in 1923, as compared with 1919, is 10.9 per cent. So large a decrease in traffic

has made it impossible, with existing rate of fare of 8 cents cash or 6 tokens for 40 cents, to earn a reasonable return upon the value of the railway property as fixed by the Public Utilities Commission.

With respect to the bills introduced in Congress requiring the restitution of the 5-cent fare with six tickets for a quarter, Mr. Ham says it is impossible to return to a pre-war rate of fare until other conditions, over which the company has virtually no control, are again upon a pre-war basis.

The company placed in operation during the year thirty cars of the pay-within type for two-man operation and ten cars of the pay-within type for one-man operation. It also added seven buses, making the total number now in operation fifteen.

Bus operations have been substituted during the non-rush periods for street cars from Seventeenth and H Streets, N. W., around the Potomac Park Loop, continuing the street car operations in the morning and evening rush periods. Just prior to the close of the year the company extended the operation of this bus line to the Lincoln Memorial. Bus operation now furnishes service on two important lines of the company during the early morning hours when traffic is extremely light. On Aug. 1, a Southwest crosstown bus line was established by the Capital Traction Company for the joint account of that company and the Washington Railway & Electric Company, with an exchange of transfers between lines of both companies.

Mr. Ham says that while the introduction of buses was intended primarily to afford greater convenience to the public and has, in fact, greatly increased these facilities, the operation has been without profit.

Chicago "L" Reorganization Formally Declared Operative

The plan for the reorganization of the elevated railways in Chicago has been declared operative as to all classes of securities and claims entitled to participate therein. It is contemplated that the new securities deliverable by the committee to holders of certificates of deposit will be ready within a short time.

Charles E. Mitchell, chairman; George M. Reynolds, John H. Mason and R. Floyd Clinch, committee acting in the reorganization, say approximately 97 per cent of the secured gold notes and more than 90 per cent of ten-year 6 per cent debentures have been deposited under the plan of reorganization dated July 14, 1923; and in pursuance to the plan, the collaterals pledged for security of the notes have been acquired and the new company under the name of Chicago Rapid Transit Company has been organized. As has been announced previously in the ELECTRIC RAILWAY JOURNAL the new company is now operating the properties.

Increase in Columbus Surplus

Ohio Company Shows a Big Gain in Amount Left Over Charges, Taxes, Interest and Dividends

The Columbus Railway, Power & Light Company, Columbus, Ohio, reports good progress made in its affairs during the year ended Dec. 31, 1923. There was an increase over the previous year in the number of passengers carried, in transfer passengers, in revenue and in surplus derived. There was also an increase in surplus over all charges, including taxes, interest and dividends.

C. L. Kurtz, president of the company, says that it should be gratifying to the public, as well as to stockholders, to realize that the company, operating under rates of fare about 40 per cent lower than is the average rate of fare in all other cities of the country, has been able to attain surplus earnings necessary to the strengthening and continued upbuilding of the service.

Mr. Kurtz said in the pamphlet report of the company that the requirements of the company for the construction program of 1924 have not yet been arranged, but he did repeat the need of the company for fifty new cars.

During the year the dividend rate on Series "B" preferred stock was increased from 5 to 6 per cent, and a dividend rate of 6 per cent was declared on the common stock, thus putting all three classes of the company's stock

STATEMENT OF EARNINGS OF COLUMBUS RAILWAY, POWER & LIGHT COMPANY FOR YEARS ENDED DEC. 31

	1922	1923
Railway operating revenues.....	\$3,611,590	\$3,702,221
Power, light and heat operating revenues.....	3,880,440	4,749,233
Non-operating revenues.....	7,312	11,268
Total gross revenues.....	\$7,499,342	\$8,462,724
Operating expenses.....	\$4,531,604	\$4,955,526
Taxes.....	765,684	839,461
Gross Income.....	\$2,202,054	\$2,667,735
Deductions from Gross Income:		
Interest on funded debt.....	\$818,554	\$806,733
Interest on unfunded debt.....	12,341	13,354
Other deductions.....	77,628	62,042
Total deductions.....	\$908,524	\$882,130
Net income available for sinking fund, dividends and other financial requirements.....	\$1,293,529	\$1,785,604
Deductions from Net Income:		
Sinking fund.....	\$245,845	\$233,650
Dividends:		
Series A preferred stock.....	91,227	121,636
Series B preferred stock.....	188,014	300,998
Common stock.....		360,354
Balance (credit to profit and loss account).....	\$768,441	\$768,964

on a 6 per cent basis. Mr. Kurtz further said that the growing interest and confidence of the public and of investors in the securities of the company is helping to produce satisfactory results to both the investors and the community served.

At this annual meeting the Columbus, New Albany & Johnstown Traction Company was completely purchased. This was a short interurban line the stock of which has been slowly acquired by the Columbus Railway, Power & Light Company, by which it has been operated the last two years.

Pay-as-You-Go Purchase Plan Suggested for San Francisco

The special committee, composed of supervisors and city officials of San Francisco, appointed a year ago to consider the purchase of the Market Street Railway by the city has blocked out a tentative "pay-as-you-go" proposition as a basis for conference with the railway.

The plan outlined contemplates submission of the purchase proposed to the people, but not as a bond issue proposition. The plan now contemplated to be put into effect would not involve the city in a bonded debt, and could be carried by a majority vote. On the basis of the gross receipts of the company's lines, deductions are to be subtracted for the increase of wages, amounting to \$1,800,000 a year under the municipal pay schedule; for the operating expenses; for depreciation, and for interest upon whatever "price" is finally agreed upon. The committee stated that the nub of the whole matter would be this figure.

On the basis of the present showing it is estimated that it would take between twenty-five and forty years, according to the valuation finally agreed upon, to pay for the system. These figures are based on the present 5-cent fare.

Hearings Under Way Looking Toward Kansas City Foreclosure

Powell C. Croner, attorney for the committee representing the holders of the first mortgage bonds of the Kansas City Railways, urged before Judge Stone in the federal court at Kansas City recently that the valuation of the property be determined at once, after which a concrete plan for reorganization will be submitted to the court. Mr. Groner said the revaluation would be necessary eventually, and urged that it be made now so that complications in the future could be avoided. He said the plan of the first mortgage bondholders to foreclose then would be carried out.

Stockholders in the company asked permission to present a supplementary answer, containing a statement of their interests in the reorganization. Judge Stone took the application under advisement. Richard J. Higgins, attorney

for the first mortgage bondholders, said the stockholders have waited too long to advance their claims. He contended both the bondholders and the stockholders were "in the same boat."

William Bostian, attorney, and Frank J. Peterson attended as representatives of the traveling public. To their plea for consideration Judge Stone replied that no definite plan of reorganization had been placed before him, but that when such a plan was presented, he would be glad to hear the opinions of patrons and others before taking final action.

Refunding Issue Authorized by California Commission

The Market Street Railway Company, San Francisco, has been authorized by the Railroad Commission to issue and sell for cash at not less than 93 per cent of their face value, and accrued interest, \$13,000,000 of first mortgage 7 per cent sinking fund gold bonds to be dated April 1, 1924, and to mature April 1, 1940, and to use the proceeds obtained therefrom for the purpose of refunding its 6 per cent collateral trust notes due April 1, 1934, and its first mortgage bonds due Sept. 1, 1924.

The company agrees to provide a quarterly sinking fund at the rate of \$500,000 per annum from Jan. 1, 1925, through 1932. The sinking fund payments are to be invested in the company's bonds, which are to be purchased in the open market at not to exceed their redemption prices, or if not so obtainable, are to be called at that price. All bonds purchased are to be kept alive in the sinking fund until Jan. 1, 1933, and the interest on such bonds is to be used to acquire additional bonds. On Jan. 1, 1933, all bonds then in the sinking fund shall be cancelled and thereafter the company agrees to provide a quarterly sinking fund of \$300,000 per annum until the maturity of the bonds.

The commission in its decision points out that were it not for the fact that some of applicant's important franchises expire on or before Jan. 1, 1933, existing municipal competition, and the uncertainty of what the attitude of the city will be at the time the franchises terminate, the commission would not authorize the sale of the

bonds at 93 and accrued interest.

It is estimated by the applicant that the operation of the sinking funds, assuming bonds purchased at the redemption prices, will reduce the bonded debt from \$13,000,000 to \$8,071,500, on Jan. 1, 1933, and to \$5,460,500 on Jan. 1, 1940. The amount of bonds outstanding may be further reduced through the purchase of bonds at less than the call price, and through the sale of mortgaged property. The proceeds from the sale of any such property must be added to fixed sinking fund payment.

The bonds were recently offered for public subscription at 100 and accrued interest, subject to the approval of the commission.

Columbus, Newark & Zanesville Elect Officers and Directors

The stockholders of the Columbus, Newark & Zanesville Electric Railway, Springfield, Ohio, held their annual meeting Feb. 12 at Columbus. The following directors were named: Charles Day, Philadelphia, Pa.; John S. Bleecker, Springfield, Ohio; F. A. Healy, Springfield, Ohio; R. Z. Zimmermann, Zanesville, Ohio, and Edward H. Meyer, Zanesville, Ohio. The directors elected the following officers: Charles Day, president; R. Z. Zimmermann, vice-president; F. A. Healy, secretary and treasurer; J. M. Pogue, assistant secretary and treasurer; E. A. McClure, assistant secretary, and Melward Oliver, assistant treasurer.

Suit Brought to Set Aside Oakland Consolidation

A suit to set aside the reorganization of the San Francisco-Oakland Terminal Railways into the Key System Transit has been filed in the Superior Court of Alameda County by Joseph Bien, representing minority holders of the common stock of the old organization. The court is asked to rule the entire reorganization proceeding null and void and to restore the old company to solvency, basing this demand on the allegation that the company's properties are worth \$50,000,000. Mr. Bien further declares that the common stockholders held \$48,175,000 of stock and that their rights were not properly recognized in the resale of the property.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares* 1913 = 4.84	Feb. 1924 6.93	Jan. 1924 6.91	Feb. 1923 6.94	May 1921 7.24	May 1923 6.88
Street Railway Materials* 1913 = 100	Jan. 1924 159	Dec. 1923 156	Jan. 1923 175	Sept. 1920 247	Nov. 1921 156
Street Railway Wages* 1913 = 100	Feb. 1924 219	Jan. 1924 219	Feb. 1923 207	Sept. 1920 232	Apr. 1923 207
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Jan. 31 1924 4.80	Dec. 31 1923 4.45	Jan. 31 1923 6.91	July 31 1920 11.12	Feb. 28 1922 4.14
U.S. Bank Clearings Outside N. Y. City (Billions)	Jan. 1924 16.14	Dec. 1923 15.90	Jan. 1923 16.00	Mar. 1920 18.54	Feb. 1922 10.65
Business Failures Number	Jan. 1924 2,258	Dec. 1923 1,862	Jan. 1923 2,203	Jan. 1924 2,258	Sept. 1923 1,280
Liabilities (millions)	109.1	80.37	53.60	109.1	27.50

Conspectus of Indexes for February, 1924

Compiled for Publication in this Paper by
Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	Feb. 1924 220.3	Jan. 1924 217.9	Feb. 1923 197.4	June 1920 273.8	Mar. 1922 162.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Jan. 1924 151	Dec. 1923 151	Jan. 1923 156	May 1920 247	Jan. 1922 138
Bradstreet's Wholesale Commodities 1913 = 9.21	Feb. 1 1924 13.20	Jan. 1 1924 13.27	Feb. 1 1923 13.72	Feb. 1 1920 28.57	June 1 1921 10.62
Dun's Wholesale Commodities 1913 = 120.9	Feb. 1 1924 191.1	Jan. 1 1924 189.9	Feb. 1 1923 186.2	May 1 1920 263.3	July 1 1921 159.8
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Jan. 1924 149	Dec. 1923 150	Jan. 1923 144	June 1920 219	Mar. 1922 139
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	Jan. 1924 164.6	Dec. 1923 165.0	Jan. 1923 158.1	July 1920 204.5	Aug. 1922 154.5

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of

materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Interborough Rapid Transit Will Appeal Dividend Decision

Justice Ford of the New York Supreme Court on Feb. 13 sustained the demand of Nina M. Peabody, holder of shares of Manhattan Railway stock, who sought to recover payment of 7 per cent on the par value of her holdings from Jan. 1, 1922. The action was brought against the Interborough Rapid Transit Company.

Justice Ford held that the Interborough Rapid Transit when it took a lease of the Manhattan Railway for 999 years guaranteed to pay 7 per cent dividends to Manhattan Railway stockholders for all times unless all "holders of record should join in consenting to a modification." The defendant contended that the earnings of the elevated lines no longer warranted the 7 per cent payment and after negotiations the majority of the Manhattan holders agreed to a modification of the terms of the payments under the lease.

The decision will be appealed to the Appellate Division of the State court. It is pointed out by Interborough interests that the decision is just the opposite of that handed down by Justice Lehman of the same court some time ago on the same question, action having been brought by another stockholder. In other words, due to a technicality, contrary opinions have been handed down on the same question, according to the attorneys. Both cases will be decided by the higher court.

Net Income Increases in Detroit

The Department of Street Railways, city of Detroit, for the month of December, 1923, reported a total operating revenue of \$1,876,514, against \$1,650,927 for December, 1922. These figures included respectively \$1,828,908 and \$1,560,663 for total revenue from transportation. Total operating expenses showed an increase, being \$1,213,884 in December, 1922, and \$1,375,141 in December, 1923.

The net revenue from railway operations amounted to \$501,373 in December, 1923, against \$437,043 in December, 1922. The net income increased from \$47,271 to \$65,254. There were 39,504,361 passengers carried in December, 1923, and 38,258,194 in December, 1922.

Foreclosure Sale at Birmingham Set for March 15

Announcement is made of the proposed sale of the property of the Birmingham Railway, Light & Power Company, Birmingham, Ala., under foreclosure on March 15.

The Tidewater line, which runs from East Lake to Ensley, a distance of about 14 miles, will not be included in the sale, it is stated. Some weeks ago the receivers of the company asked permission of the City Commissioners to abandon certain portions of the Tidewater track, saying that this line did not pay and that it was a burden to the other lines. This request was refused. It is stated that if the receivers and the City Commissioners are unable to agree on the disposition of the Tidewater line the Alabama Commission will be asked to settle the matter.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were no sales of electric railway securities this week.

Public Service Reports Deficit.—A deficit of \$319,654 in the net income of the Public Service Railway, Newark, N. J., is indicated in the company's financial statement for 1923. This is in contrast to a net income of \$543,905 for 1922 and is attributed largely to the strike of the employees last fall. The operating revenue for the past year was \$20,878,799, compared with \$26,116,405 in 1922. Operating revenue deductions were \$17,223,886 in 1923 and \$20,492,478 in 1922, while the operating income for each of the two years was \$3,668,616 and \$5,647,209 respectively.

Will Redeem Coupon.—Coupons No. 22, dated Sept. 1, 1917, of the general consolidated first mortgage fifty-year 5 per cent gold bonds of the Mexico Tramways will be redeemed on and after March 1.

Lighting Property Purchased.—The Marion & Bluffton Traction Company, Bluffton, Ind., already engaged in the power and light business, has bought the property of the Linn Grove Light & Power Company, consisting of 50 miles of line and city equipment.

Boston "L" Bond Issue Approved.—The Massachusetts Department of Public Utilities has approved issuance by the Boston Elevated Railway of \$2,098,000 of thirty-year 6½ per cent bonds. They will be callable after ten years at 105. Of them \$1,500,000 will be used for refunding. The application of the company was referred to previously in the ELECTRIC RAILWAY JOURNAL.

\$1,836,712 Net Income.—For the six months ended Dec. 31, 1923, the Brooklyn-Manhattan Transit System, Brooklyn, N. Y., and its affiliated companies reported a total operating revenue of \$19,576,898. The expenses were \$13,001,474. These two figures are compared with \$18,110,247 and \$11,954,375 for the same period ended Dec. 31, 1922. The net income in 1923 for the six months amounted to \$1,836,712. There is no figure to be compared with this 1923 net income on account of the receivership and reorganization.

Tax Not Discriminatory.—The Washington State tax upon street railways is not discriminatory nor confiscatory, the United States Supreme Court declared Feb. 18 in a decision adverse to the Puget Sound Power & Light Company and the city of Seattle in their suit against the County of King, and others. The company sold its street railway lines to the city in 1919. Prior to the sale state and county taxes had been assessed. The city joined the company in resisting the tax on the ground it was assessed on a higher basis than other property. The Supreme Court found nothing illegal in the method of assessment.

Ohio Road to Be Sold Under Hammer.—The property of the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, will be sold at auction at Elyria on March 14, an order for the foreclosure sale of the property

having been issued by Federal Judge D. C. Westernhaven, on application of bondholders and creditors. The company has outstanding \$4,236,000 of common stock and \$2,413,000 of cumulative 5 per cent preferred. It was put into receivership on Jan. 20, 1922, on an insolvency petition filed by the General Electric Company.

Officers and Directors Elected.—At the annual meeting of the Columbus Interurban Terminal Company, held on Feb. 12, in Columbus, Ohio, the following officers were elected: A. V. Bland, Columbus, Ohio, president; A. T. Van Denise, Marion, Ohio, vice-president; F. A. Healy, Springfield, Ohio, secretary and treasurer. The following directors were also named: A. V. Bland, Columbus, Ohio; J. M. Pogue, Springfield, Ohio; R. Z. Zimmermann, Zanesville, Ohio; J. S. Bleeker, Philadelphia, Pa.; A. T. Van Denise and W. P. Maloney, both of Marion, Ohio.

New Director Elected.—Morton J. Jourdan, attorney, who has represented the North American Company in the receivership litigation in connection with the affairs of the United Railways, St. Louis, was elected a director of the company at the annual election held on Feb. 11. He succeeds R. L. Warner.

Increase in Passengers Carried.—The net income of the Philadelphia Rapid Transit Company, Philadelphia, Pa., for January, 1924, was \$250,317, against \$250,100 for the same month a year ago. The passenger revenue amounted to \$3,748,596, an increase over 1923, when it was \$3,625,768. The number of passengers carried increased from 74,857,899 in January, 1923, to 78,297,258 in the same month of the current year.

Strike Cost \$1,027,238.—The International Railway, Buffalo, N. Y., reports a deficit of \$1,027,238 for the year 1923, which represents the company's strike cost. In 1922 the deficit was \$4,171,847 and in 1921 the company reported a net income of \$99,110. The operation and taxes showed a falling-off, the 1923 figure being \$9,293,963, against \$10,044,655 for the year 1922.

Maine Property Fails to Earn Enough.—For the year ended Dec. 31, 1923, the Cumberland County Power & Light Company, Portland, Me., had a surplus of \$283,480, against a surplus of \$352,881 for the same period a year ago. The Portland Railroad, which is leased by the Cumberland County Power & Light Company, reports a deficit for the year ended Dec. 31, 1923, amounting to \$40,897, against a deficit of \$4,913 for the year previous. The report to the stockholders says that the operations of the Portland Railroad property resulted in its failure to earn the guaranteed 5 per cent dividend upon the railway stock by nearly \$41,000.

Part of Line Near New London Abandoned.—Service on the Shore Line Electric Railway from Keeney's Corner, town of Waterford, to Bank Street and Montauk Avenue, New London, has been discontinued following an order issued by the New London County Superior Court on Jan. 18. Transportation service between the two points will be maintained by a bus line. The railway is in the hands of a receiver.

Traffic and Transportation

Fare Changes Suggested

Oklahoma City Committee Against Trustees' Operation—Use of Pass With Ten-Cent Fare Suggested

A report adverse to the proposal has been presented by the committee of the Chamber of Commerce at Oklahoma City appointed to consider among other things the suggestion that a committee from local civic organizations take over the Oklahoma Railway as trustees and operate the property for one or two years.

The committee recommends an increase in fare and revision of traffic ordinances in the interest of continued service in Oklahoma City and favors the operation of the property by its present executives.

The committee asks the Chamber of Commerce to request the State Corporation Commission to authorize new rates as a temporary relief measure, subject to further change in a permanent order following a complete investigation of conditions. The increase recommended includes the adoption of the weekly pass plan at \$1.25 and an increase of single fares from 7 cents to 10 cents, with three tickets for 25 cents in place of four.

The committee also requests the Chamber of Commerce to ask the City Commissioners to revise the traffic ordinances. This revision would restrict parking in the business center of the city and otherwise restrict the use of street car tracks for automobile traffic to the end that fewer interruptions and greater speed of street cars be permitted.

The committee reports against suspension or abolishment of service on lines now serving certain outlying districts where operating costs are clearly not justified by traffic.

Charges Discriminatory Rates Against Clayton, Mo.

In a decision handed down on Feb. 13 the Missouri Public Service Commission held that the difference between the Clayton and Maplewood rates charged by the United Railways was discriminatory against Clayton. The distance from the downtown section of St. Louis to Clayton is 9 miles, while the distance from the same section to the Maplewood loop is 8½ miles. The United Railways was instructed to file a new rate to be effective right away. The Claytonians asked for a 7-cent rate between the Clayton Court House and points in St. Louis.

Col. Albert T. Perkins, general manager for Receiver Rolla Wells, denied the discrimination and said that the company would ask for a rehearing. If such rehearing is not granted, he stated it would be necessary, in order to comply with the order of the commission and not carry passengers at a loss, to change the fare zone limit on the Manchester line to the city limits

loop instead of at the Sutton Avenue loop as at present. This will result in the fare advance from points in the city of St. Louis to Sutton Avenue in Maplewood from 7 cents to 14 cents.

Traffic Survey in Madison

In response to a complaint the Wisconsin Railroad Commission will undertake an investigation into the service of the Madison Railways. W. H. Damon, engineer of the commission, will be in charge. A traffic count will be made on every line during the rush hours to determine whether or not the company is furnishing sufficient service to handle peak loads. Heating conditions in cold weather will also be covered by the investigation.

Joint Steam and Electric Service in Texas Popularized

The Texas Interurban Railway, operating from Dallas to Terrell, Tex., has effected a working agreement with the Texas Midland Railway, a steam line operating from Ennis, Tex., to Paris, Tex., and passing through Terrell, by which through tickets are sold on either line to points on the other at short-line rates. Close connection is also made at Terrell between the interurban cars from Dallas and the trains on the Texas Midland, so that passengers purchasing through tickets will not have a long wait. Both lines use the same depot, which adds greatly to the convenience of those purchasing through tickets.

Arrangements have also been completed whereby patrons of the Texas Interurban Railway or of the Texas Midland Railway may use the facilities of either or both companies for making Pullman reservations in Dallas, for reserving theater tickets, making appointments in Dallas, etc. This unusual service rendered by the Texas Interurban Railway is proving very popular, and patrons of the electric line residing in Terrell or along the line of the Texas Midland frequently make such reservations or appointments in Dallas. The service is rendered through agents of the lines in the various stations, the dispatcher's phone lines of the companies being used. It has done much to popularize the joint service rendered by the two lines.

The union of an electric line with a steam railroad is regarded as unusual, but it is known that negotiations have been under way for some time looking to the electrification of the Texas Midland by the interests who own the Texas Interurban Railway, and the close affiliation of the two lines now is regarded as an indication of an early electrification of the Texas Midland. Officials of the Texas Interurban Railway, however, are not ready to make public any details of the proposed electrification.

Muncie Jitney Operators Defended

Arguments have been heard by Judge Robert F. Murray in the Superior Court on the motion to dissolve the temporary restraining orders covering fifteen defendants in the suit brought by the Union Traction Company of Indiana against twenty-five Muncie jitney operators.

William A. Thompson, former judge of the Circuit Court, appeared for thirteen of the defendants. He attacked the restraining order on the grounds that the information in the complaint was not properly verified. Other defendants attacked the restraining order on other grounds, chiefly that the city ordinance pertaining to jitneys was illegal.

Suggests Commission Dispose of Philadelphia Ordinance

Mayor Kendrick of Philadelphia, Pa., recently suggested that the entire bus ordinance controversy should be turned over to the Transit Commission for settlement. Further, that that body should be urged to work out an agreement favorable to both the city and the Philadelphia Rapid Transit Company. The bus ordinance calls for the granting of franchises for four bus lines to the Philadelphia Rural Transit Company, which is controlled by the Philadelphia Rapid Transit Company.

The day previous to the Mayor's suggestion the Council had returned the ordinance to the transportation committee for further hearing. Simon Walter, chairman of the committee, said that the return of the bill was based solely on objections which have been raised to the clause providing for a financial return to the city for the use of the streets and fixing the date of expiration of the lease as 1957. Opponents have stood for a short-term lease.

More Passengers Ride the Cars in Elmira in 1923

The Elmira Water, Light & Railroad Company, Elmira, N. Y., carried 8,237,480 passengers on its city lines in 1923, compared with 8,137,518 in 1922 and 7,447,068 in 1921. All these passengers were carried without a single serious accident to any passenger. These facts were disclosed in the brief report about the accomplishments of the company in 1923, recently submitted to the stockholders.

The company states that this is the least prosperous of the departments, due to the large and increasing number of automobiles, the habit many automobile drivers have of "picking up" friends or even strangers who are waiting for street cars and the congestion in the downtown streets. With the brief report was attached an editorial reprinted from the *ELECTRIC RAILWAY JOURNAL* on "A Basis for Getting the Merchants to Accept Traffic Regulation."

These things were all emphasized particularly for the benefit of the local stockholders.

Talks to Northeastern "Civils."—Edward Dana, general manager of the Boston Elevated Railway, addressed the Northeastern Section of the American Society of Civil Engineers at the Boston City Club recently upon "The Elevated as You Should Know It." The talk comprehensively outlined the Boston transit problem as it is being solved by the company.

Save the Children.—Mayor Kendrick of Philadelphia, Pa., recently designated Feb. 21 as Public Safety Day, to reduce the growing number of accidents to children in the city. Safety rules have been laid down for children in streets and all have been urged to do their part in reducing the death rate.

Applies for Ten-Cent Rate.—A net operating loss of more than \$70,000 in 1923 is responsible for the application of the Androscoggin & Kennebec Railway, Lewiston, for permission of the Maine Public Utilities Commission to install a 10-cent zone rate on all lines of the system. It is expected an increase in revenue to the amount of \$130,000 would result from the 10-cent rate. The zone rate has been 9 cents.

Bus Operation Ordered Discontinued.—The Board of Public Utility Commissioners of New Jersey has ordered George Zellers, Sr., George Zellers, Jr., Louis Kessler and Frank Sidone to cease the operation of any bus upon any street in the city of Millville, in the Borough of Vineland or between these places upon which the Millville Traction Company operates a railway line effective Feb. 20, 1924.

By Their Badges Ye Shall Know Them.—A neat coat lapel badge of blue enamel and white metal has been supplied to Los Angeles Railway trainmen and will be the official insignia of the company. It has the initials "L. A. Ry. Co." and must be worn on the left coat lapel. Recently brass buttons for trainmen's uniforms were discarded and plain black buttons substituted so that employees might get greater use from their uniforms as civilian suits. The brass button had the official insignia of the company, but with the change to the use of the lapel badges, the insignia of service is required to be worn only while a man is in service on the cars. A charge of \$1 is placed against the record of each man to whom a badge is issued, but this sum is returned on the surrender of the badge when the man leaves the service.

Protests Bus Certificates.—The Lima Street Railway, Lima, Ohio, filed protests with the State Public Utilities Commission on Feb. 15 against the granting of certificates to many former employees of the company to operate bus lines in Lima.

Invites Motorists to Use Tracks.—Motorists of Muskegon, Mich., have been invited by George Steinwedell, president and manager of the Muskegon Traction & Lighting Company, to use the car tracks for travel since 4 ft. of snow make going impossible otherwise in certain sections of the city. At the same time Mr. Steinwedell announced that railway employees had been requested to show every courtesy to motorists and incidentally asked for the co-operation of the driving public

in limiting delays due to automobiles and trucks. The statement created a friendly spirit between motorists and the company and won many friends for the company. Motorists had been using the tracks because of the snowdrifts and so Mr. Steinwedell decided that there should be co-operation.

Planning Opening of New Line.—Officials of the Des Moines City Railway, Des Moines, Iowa, are making more or less elaborate plans for the formal opening of the new Crocker Street line. The line now ready has been in prospect for many years as it was one of the proposals incident to the 1915 franchise election, but its construction was delayed by the war period and later by the receivership. Eight of the new passenger cars ordered by the company several months ago are ready for service and the initial trip over the new line will be made by one of these new cars carrying city officials, newspaper editors and representatives of various civic and improvement organizations.

Seeks to Reduce Fares.—The Detroit United Railway, Detroit, Mich., has applied to the Public Utilities Commission for permission to reduce fares between Detroit and Pontiac from 52 to 26 cents, effective March 1. The reduction would apply only to commutation fares.

Ticket Privilege Extended.—It was decided at a recent meeting of the board of directors of the Montreal Tramways, Montreal, Que., to extend the privilege of using children's tickets to school children under the age of eighteen years, while children or students between the ages of fifteen and eighteen are to be obliged to carry identification cards with their portraits thereon. The hours during which these tickets will be valid extend from 7 a.m. to 7 p.m. on every day of the week. This change will go into effect immediately.

Bus Line to Accommodate Students.—The Portland Railway, Light & Power Company, Portland, Ore., has announced that a new crosstown bus line will be established to provide transportation for students of the U. S. Grant High School. This is the first bus line announced by the company and was decided upon when investigation showed that the cost of laying new car tracks and overhead line had quadrupled since 1914.

No More Letter Boxes on Street Cars.—Light motor trucks have superseded the cars of the Twin City Rapid Transit Company in the carriage of letter mail between Minneapolis and St. Paul. In daylight hours each through street car operating over the shortest route between the two cities carried a letter box on the rear platform outside. Letters could be mailed anywhere on the route and bundles of letters were put on the cars at both postoffices. This service had been in operation twenty-four years. The trucks leave either city every half hour at the rush time and every hour the rest of the day. They carry more classes of mail and stop at substations en route and may be stopped along the road to receive mail. The trucks are operated by the postoffice department.

Bus Company Seeks to Operate.—The Ohio Utilities Commission has forbidden the Red Star Bus Company to operate between Columbus and Chillicothe. The decision was based on the statement that the Scioto Valley Traction Company, operating between the two points, was furnishing adequate service. The Red Star Bus Company has declared, in a brief filed in the Supreme Court recently, that motor bus transportation in Ohio is "doomed" if the ruling of the commission is to stand as a precedent.

Wants No Speed Restrictions.—The Birmingham Railway, Light & Power Company, Birmingham, Ala., has requested the City Commission to take off all restrictions on the speed limit of its cars or place them on the same running basis as automobiles. The ordinance under which the cars now operate fixes the maximum speed at 8 m.p.h. at crossings, with 12 m.p.h. between intersections. The automobile limit is 15 m.p.h. at crossings and 25 m.p.h. between intersections.

Safety Example Followed.—Following the example of the Wisconsin division of the Chicago & North Western Railroad, which is carrying on a safety campaign for the elimination of grade crossing accidents by requesting employees of the company having automobiles to come to a stop upon approaching such crossings, the safety committees of the Eastern Wisconsin Electric Company, Sheboygan, Wis., plans to follow the same idea. All employees of the company will be requested to follow the same procedure when approaching crossings whether steam or electric railway.

Denver Tramway Wins.—The winners of the electric railway prizes in a recent essay contest were all employees of the Denver Tramway, Denver, Colo. The Rocky Mountain Committee on Public Utility Information offered prizes to the various employees of the different cities over which its jurisdiction extended. The competition was that of knowing the "why and the how" of the public utility that employed them, so that seekers after information would receive the necessary assistance. The public utilities services covered were tramway, electric light and power, gas and the telephone. In all there were ninety contestants.

Six Cents in Shreveport.—The fare now in effect in Shreveport, La., is 6 cents. The three-year controversy, court fights and counter-suits were terminated some weeks ago by the dropping of the 7-cent rate and the restoration of the 6-cent fare, which is the amount the citizens allowed in the election of 1920. When the courts decided that the election was illegal the fare went to 5 cents. The Shreveport Railways then raised the fare to 7 cents, which was contested by the Public Service Commission. The Industrial Bureau of the Shreveport Chamber of Commerce intervened and through its efforts a settlement was brought about by which the rate of fare of 6 cents was restored. The various developments in the controversy have been covered from time to time in these columns.

Personal Items

Accountant Becomes Manager

J. M. Pogue, Long Connected with Ohio Interurbans, Will Conduct Indianapolis, Columbus & Eastern Traction Line

J. M. Pogue, recently appointed general manager of the Indianapolis, Columbus & Eastern Traction Company, has literally grown up with the business and has done little else but work on railroads since he was old enough to work. Still in his middle thirties, Mr. Pogue has been connected with Ohio interurban properties since 1907. He began as an accountant in the office of the comptroller of the Cincinnati Traction Company and later became chief accountant of the Cincinnati Northern Traction Company.

When the general offices of the



J. M. Pogue

Ohio Electric Railway system were moved to Springfield, in 1914, Mr. Pogue was appointed assistant secretary and treasurer and remained on that job until 1917, when he was promoted to the office of general purchasing agent for the entire system. When the property went into a receiver's hands in 1921, he was retained as general purchasing agent of the various leased properties which had been welded into the system, including the Indiana, Columbus & Eastern Traction Company, the Columbus, Newark & Zanesville Electric Railway, the Lima & Toledo Railroad and the Lima City Street Railway.

In his new position as general manager for the Indianapolis, Columbus & Eastern Traction Company he will have charge of the operation of the interurban lines from Dayton to Columbus and from Springfield to Lima, two of the busiest in the State of Ohio.

M. L. Campbell, Buffalo, has been appointed superintendent of the Lockport and Olcott interurban division of the International Railway, Buffalo.

This appointment has been announced by R. C. Larkin, Niagara Falls, general superintendent of the interurban divisions of the International. Mr. Campbell succeeds John Duerr of North Tonawanda.

W. S. Jenkins has been appointed division superintendent of the Market Street Railway, San Francisco, Cal. He will be in charge of the Twenty-fourth, Utah and Third Street divisions.

H. C. Mackay, who has been treasurer of the Wisconsin Railway, Light & Power Company, Winona, Minn., for many years, will assume the joint duties of secretary and treasurer, as William M. Chester, for many years secretary, has resigned.

Grant Bergsland, connected with the Wisconsin Railway, Light & Power Company, Winona, since July, 1923, has been appointed master mechanic in charge at La Crosse.

A. C. Ward has replaced S. W. Willers as chief engineer of the power station of the Fort Smith Light & Traction Company, Fort Smith, Ark.

R. B. Keating has been elected treasurer of the Monongahela-West Penn Public Service Company, Fairmont, W. Va., to succeed the late Walton Miller. Mr. Miller was also secretary of the company and in that capacity he has been succeeded by S. E. Miller, who was assistant secretary.

John E. Zimmermann, of Day & Zimmermann, was elected president of the York Railways, York, Pa., at the meeting of the board of directors on Jan. 22.

C. T. Wingate, conductor on the Market Street line of the Louisville Railway, was elected employee-director of the company by a vote of the employees on Feb. 14. He succeeds D. L. Kehl, who had served two one-year terms on the board of directors, as employees' representative. Mr. Kehl came from the maintenance of ways department and was runner up for a third-term election.

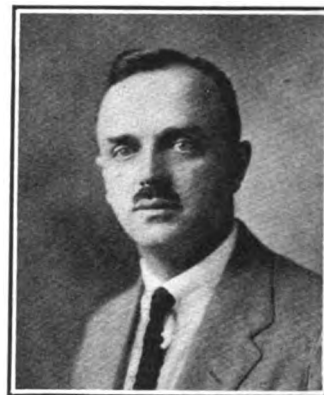
Otto H. Adams, in the employ of the Indiana Service Corporation, Fort Wayne, Ind., since 1908 and for some time chief clerk to J. A. Greenland, has been made district freight and passenger agent, succeeding John W. Lowry. J. F. Beber, ticket agent, in the employ of the company for sixteen years, will succeed Mr. Adams as chief clerk to the superintendent. William Zimmerman, ticket agent at Lafayette, will assume the former duties of Mr. Beber as ticket agent in Fort Wayne. Leonard Nipple, assistant agent at Logansport, has been promoted to ticket agent, succeeding Mr. Zimmerman at Lafayette.

Henry Grant, recently appointed superintendent of the Tacoma lines of the Puget Sound Electric Railway, entered the service of the Stone & Webster interests in 1912 as electrical engineer and roadmaster for the Pacific Northwest Traction Company in Bel-

lingham. He remained in this position until 1917, when he entered the U. S. Army, serving until 1919. From 1919 to Dec. 31, 1923, Mr. Grant served as superintendent of the interurban and city lines of the Puget Sound Railway in Everett, when he was advanced to his present position. He was graduated from Cornell University in 1912 as a mechanical engineer.

J. E. Wayne Vice-President and General Manager at York

Joseph Edward Wayne, formerly vice-president and assistant general manager of the York Railways and subsidiary companies, has been made vice-president and general manager at York, Pa. Mr. Wayne has been associated with several large electric railway properties in various sections of the country. He served for three years in the repair shops and power house of the Public Service Corporation of New Jersey, and later became identified with the transportation department of the United Railroads of San Francisco. Still later he became superintendent of the Chambersburg, Greencastle & Waynesboro



J. E. Wayne

Street Railway. He resigned from this company and entered the services of the Edison Light & Power Company in York and in 1909 was appointed superintendent of transportation of the York Railways. Following this, he was advanced to the position of vice-president and general manager. Mr. Wayne was born in Philadelphia.

Martin Juhl, for many years district superintendent of the Lake Superior District Power Company, Ashland, Wis., has been selected to take charge of the electric distribution plant of the Washburn Electric Light & Power Company, which the Lake Superior District Power Company recently took over.

George Teague has been promoted to the position of assistant railway superintendent of the Pacific Northwest Traction Company and Puget Sound International Railway & Power Company in Everett, Wash., to replace C. C. Coates, who has been advanced to the position of superintendent. Mr. Teague has been connected with the company for the past five years in the operating department.

Obituary

Dr. Henry Jameson

Dr. Henry Jameson, prominent in the medical, business and civic life of Indianapolis for nearly half a century, died on Feb. 13 at his home in that city, after a brief illness, of pneumonia.

Dr. Jameson was chairman of the board of directors of the Indianapolis Street Railway and the chairman of the general plan committee of the Butler College board of trustees, in charge of developing the project for removing Butler College to its new site in Fairview Park. For a number of years he was a member of the Board of Park Commissioners, his labors with that body causing him to become known as the father of the city's boulevard system.

Dr. Jameson was one of the leading physicians of the city and was active in teaching at medical schools during the latter part of the nineteenth century and the early part of this. He had not been active in the practice of medicine for about ten years, although he still retained an office and was called into consultation at times.

B. L. Knowles, manager of the publicity department of the Worthington Pump Corporation, died on Feb. 14. Mr. Knowles was forty-five years old. He had been in the employ of the Worthington company for twenty-eight years.

John Mahoney, superintendent of the Hudson Valley Railway, Glens Falls, N. Y., died recently. He had been associated with the Glens Falls property from the time it was under construction. When the work was completed and the route covered the entire distance from Warrensburg to Troy Mr. Mahoney assumed the duties of superintendent.

Edward Heydon, age fifty-four, superintendent of overhead of the Indianapolis Street Railway, died Feb. 7 in Indianapolis, after an illness of one day. He had been employed by the present Indianapolis company and its predecessors twenty-five years.

John Graham, Philadelphia, who, with Percy Warner of Nashville, was one of the receivers of the railway system included in the Chattanooga Railway & Light Company, died at his home in Philadelphia on Feb. 7. Mr. Graham was a consulting engineer with a national reputation. He was graduated as civil engineer from Lehigh University and first engaged in steam railroad work. After many years in this and allied lines he established himself as a consulting engineer, dealing largely with public service corporation problems.

William Flinn, former state Senator of Pennsylvania, died in St. Petersburg, Fla., on Feb. 19 following an attack of pneumonia. The firm of Booth & Flinn, of which he was the head, built a large part of the New York subways and at the present time holds the contract for the new vehicular tube which is being built under the Hudson River.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Outlook in East Promising

General Tripp, Just Returned from Orient, Says Foreign Customers Need America's Help

American manufacturers must be prepared to help in the financing of foreign power developments and to co-operate in the expanding of electric service, if we are to develop our foreign trade on an extensive scale. This opinion was firmly expressed by General Guy E. Tripp, chairman of the board of the Westinghouse Electric & Manufacturing Company, who has just returned from a trip around the world, in which he visited Japan, the Philippines, China, India and Europe. It was during his stay in Japan that General Tripp consummated the arrangements whereby the Westinghouse Electric & Manufacturing Company, together with the Westinghouse International Company, joined in co-operative agreements with the Mitsubishi interests and Takata & Company to bring about more rapid developments in electrical manufacture in Japan.

The Japanese people, General Tripp said, are re-establishing themselves from an electrical standpoint very rapidly. Only one of the large power properties was seriously damaged by the earthquake, although the destruction of transmission and distribution lines was considerable in the devastated district. A very large volume of installation work will be required in the rebuilding of Tokio, Yokohama and other communities within the zone of destruction. The great bulk of Japanese activity in the electrical field, however, is concerned with the expansion of the superpower system, which is rapidly being extended through the building of new hydro-electric stations and interconnection of existing plants.

In the Philippines, China, India and other Asiatic countries there are prospects for extensive industrial developments, but the American business man must not be deceived by the idea that Asia is industrially comparable with Europe or with America, General Tripp said.

General Tripp devoted most of his time to the Far East and made no extended investigation of conditions in Europe. He stressed the importance of recognition on the part of American manufacturers that they owe a responsibility to their foreign customers to extend practical co-operation, assisting them in the generation and utilization of electrical power, both through aid in financing their projects and through guidance in their commercial pursuits.

To Finance Industrial Buildings

A new plan to put the purchase of industrial buildings on a "pay for them as they earn for you" basis has been

announced by the Blaw-Knox Company, Pittsburgh. Factories, machine shops, commercial garages, etc., may be bought in this way.

"The need for such a plan has been evident for some time," says A. C. Lehman, president of the company.

"Expansion of a business puts pressure on all available funds. To develop new markets, finance increased production and sales effort, as well as meet current liabilities, frequently requires so much more money than is available that the contemplated progress is impossible. Our plan has been developed after many months of careful study by some of the most capable financial experts in this country. And it is big enough to provide for the financing of industrial buildings of every sort."

Long Bell Extends Operations

The Long Bell Lumber Company, after many years of manufacturing in the pine districts of the South, is transferring its operation to the Pacific Northwest. At Longview, Wash., this company is erecting what is planned to be the largest lumber manufacturing plant in the world. It will be ready to operate in the summer of 1924. This will place the Long Bell company for the first time in the forty-eight years of its history definitely in the Douglas fir market.

Heretofore this company has put all of its efforts into products that had a well defined and somewhat limited territory. With the addition of the fir lumber the scope of its activities will be greatly increased. It is planned to undertake the manufacture of ties on a large scale.

By the latter half of this year it is hoped to develop a new market as large as that now handled by its present Southern mills. With the opening of the fir operations it will be the largest lumber manufacturing company in the world.

Metal, Coal and Material Prices

Metals—New York		Feb. 21, 1924
Copper, electrolytic, cents per lb.	.....	13.375
Copper wire base, cents per lb.	.....	15.50
Lead, cents per lb.	.....	8.70
Zinc, cents per lb.	.....	7.25
Tin, Straits, cents per lb.	.....	54.00

Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$4.75
Somerset mine run, Boston, net tons	2.25
Pittsburgh mine run, Pittsburgh, net tons	2.125
Franklin, Ill., screenings, Chicago, net tons	1.95
Central, Ill., screenings, Chicago, net tons	1.50
Kansas screenings, Kansas City, net tons	2.25

Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$6.60
Weatherproof wire base, N. Y., cents per lb	17.75
Cement, Chicago net prices, without bags	\$2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	\$0.96
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.75
Turpentine, (bbl. lots), N. Y., per gal.	\$1.03

Railways Buying Safety Coaches

That electric railways are rapidly increasing their motor bus equipment is shown by the report of a single bus manufacturing concern relative to the sale of buses to railways since Jan. 1, 1924. Fageol equipment has been placed in this field during that time as follows: Milwaukee Electric Railway & Light Company, Milwaukee, Wis., five observation parlor safety coaches; Pacific Electric Railway, Los Angeles, Cal., sixteen safety coaches; Los Angeles Railway, Los Angeles, Cal., eleven safety coaches; San Diego Electric Railway, San Diego, Cal., ten safety coaches; Westmoreland County Railway, Pittsburgh, Pa. (Chestnut Ridge Transportation Company), two safety coaches.

Rolling Stock

London Street Railway, London, Ont., during 1923 increased its equipment by the addition of five one-man safety cars and three all-steel, double-truck cars of the Peter Witt type.

York Railways, York, Pa., it is reported, will buy new cars.

Track and Line

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., will repair its tracks on Madison Street, from North Street east to Broadway and on Broadway from Madison Street to the intersection of Wisconsin Avenue. This is in accordance with the recent approval by the City Council of the resolution providing for this improvement with concrete. A controversy had existed between the railway and the city with respect to the paving program, which was to be completed within one year.

Pacific Electric Railway, Los Angeles, Cal., has been granted permission by the Railroad Commission to construct a double track in Lake Avenue at grade across Washington, Rio Grande, Curtis, Denver, Howard Place, Elizabeth, Topeka and Atchinson Streets and a portion of Woodbury Road, and also to construct two turn-outs across portions of Lake and Washington Streets in the city of Pasadena. The company has been ordered to lower its tracks to specific grade level on American Avenue between Anaheim Street and North Long Beach. The company must eliminate curbs and pave the avenue full width from curb to curb.

San Diego & Arizona Railway, San Diego, Cal., has received permission to construct a spur track at grade across Eighth, Seventh, Sixth, Fourth and Second Streets and Fourth and Fifth Avenues in National City, San Diego County.

Duluth Street Railway, Duluth, Minn., is favorable to the extension of its Woodland Avenue line to Calvary cemetery, which is being urged by the Homecroft Community Club.

Ottawa Electric Railway, Ottawa, Ont., has plans looking toward building a double-track extension on Fairmont Avenue from Wellington.

Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis., is being asked to extend its railway line to Fall Creek. The distance between Eau Claire and Fall Creek is 18 miles.

London Street Railway, London, Ont., did considerable track improvement work in 1923. The pavement on Stanley Street for a distance of 1,500 ft. was completed, the track being renewed with new rail, ties and concrete foundation. The track on Briscoe Street, for a distance of 2,000 ft., was constructed with new ties on concrete foundation and paved. The double tracks on Richmond Street, from Oxford to Dufferin Avenue, approximately 1½ miles of single track, were entirely rebuilt and paved, new rail, ties and concrete foundation being used. In addition, the rail on Oxford Street, on Wellington Street south and on Horton Street, totaling 1½ miles, was replaced with new rail.

York Railways, York, Pa., has announced improvements to be made at a cost of \$100,000. It will extend its Richland Avenue line to Mill Road; the track on Overbrook Avenue from Market to King Street will be reconstructed. A new siding will be placed at Eagle Park, a rural resort, and a siding constructed at North York.

San Diego Electric Railway, San Diego, Cal., has been authorized to construct an over-grade crossing of the track of the Atchison, Topeka & Santa Fé Railway in the city of San Diego and to construct track across Witherby Street conditional upon construction of new highway.

Power Houses, Shops and Buildings

Los Angeles Railway will build the sixth automatic substation of its system at Sixth Street and Central Avenue, on the edge of the downtown business district, within a few weeks. A 1,000-kw. rotary converter, made by the General Electric Company, will be installed. The fifth automatic substation was put in service at Fifty-fourth Street and Second Avenue Feb. 1. This station has a 1,000-kw. rotary converter of General Electric type. During the year the capacity of one of the ten manually operated substations will be increased by the installation of a new converter.

Wheeling Traction Company, Wheeling, W. Va., has given a contract to the R. R. Kitchen Company for the construction of a new operating car-house at Norwood.

Crescent Belt Fastener Company, New York, N. Y., has issued a new, concisely arranged service chart covering belt joining. This chart is in card form and covers completely and specifically the means and methods to insure best results under all conditions of work. This service chart, known as Form N. Y. 298, will be sent on request to the company at 247 Park Avenue, New York.

J. B. Engineering Sales Company, Connecticut sales representative of the Conveyors Corporation of America, Chicago, has moved its office from Hartford to Chamber of Commerce Building, New Haven. This firm handles the sales of American steam jet ash conveyors and other power plant and engineering specialties.

General Electric Company, Schenectady, N. Y., has recently given new geographic designations to its district office sales territories. The new designations more accurately describe the geographic territory covered by the districts in question. The old Atlanta district is now known as the Southeastern district, Boston district as New England district, etc.

Woebler Car & Manufacturing Company, Denver, Col., suffered by fire Feb. 7 damages amounting to about \$12,000. The loss is covered by insurance. The Woebler concern was the maker of most of the tramway cars traversing the streets of Denver, but of late years the Denver Tramway, having decided to make its own cars, the Woebler concern has turned its attention largely to the making of automobile bodies.

Charles N. Pittenger, former superintendent of the Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio, is now connected with the G. C. Kuhlman Car Company, Cleveland. Mr. Pittenger went to Pittsburgh about two months ago, but shortly afterward became identified with the Kuhlman concern, a subsidiary of the J. G. Brill Company of Philadelphia. He has supervision over wiring and equipping of all cars constructed in the Cleveland plant.

Heine Boiler Company, St. Louis, Mo., announces that the Tennant Company, with offices in the Union National Bank Building, Houston, will represent it in a new territorial division comprising the entire southern half of Texas. J. A. Tennant is in charge of this office. Messrs. Smith and Whitney of Dallas will continue as the Heine Boiler Company representatives in the northern half of Texas.

New Advertising Literature

Herbert Morris, Inc., Buffalo, N. Y., has issued book 5060, entitled "Thrill in Lifting." The booklet contains some thirty pages, illustrated, describing unusual features found in Morris cranes, information on platform hoists and slings of various types, triple-gear chain-blocks and overhead monorail tracks. The book was planned to give the information in the most concise form possible on material handling machinery.

Trade Notes

Kent Engineering Company, district representatives of the Conveyors Corporation of America, Chicago, has changed its address from 504 First National Bank Building to 1110 Farnam Street, Omaha. This engineering firm handles the sale of American steam jet ash conveyors and American airtight doors, as well as other power plant equipment in Nebraska and western Iowa.

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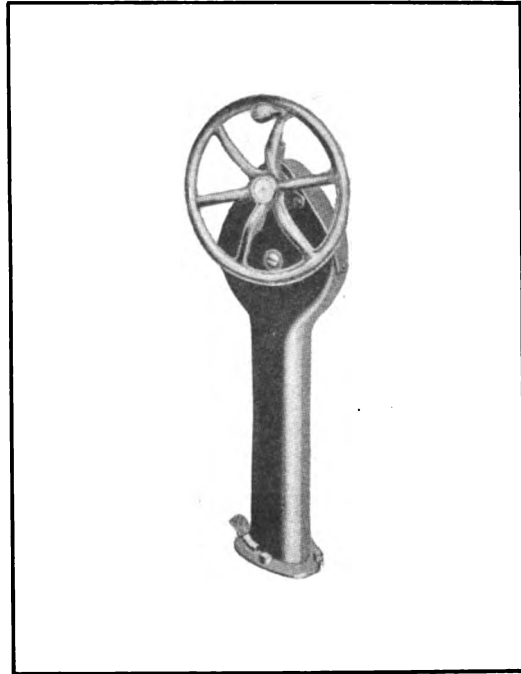
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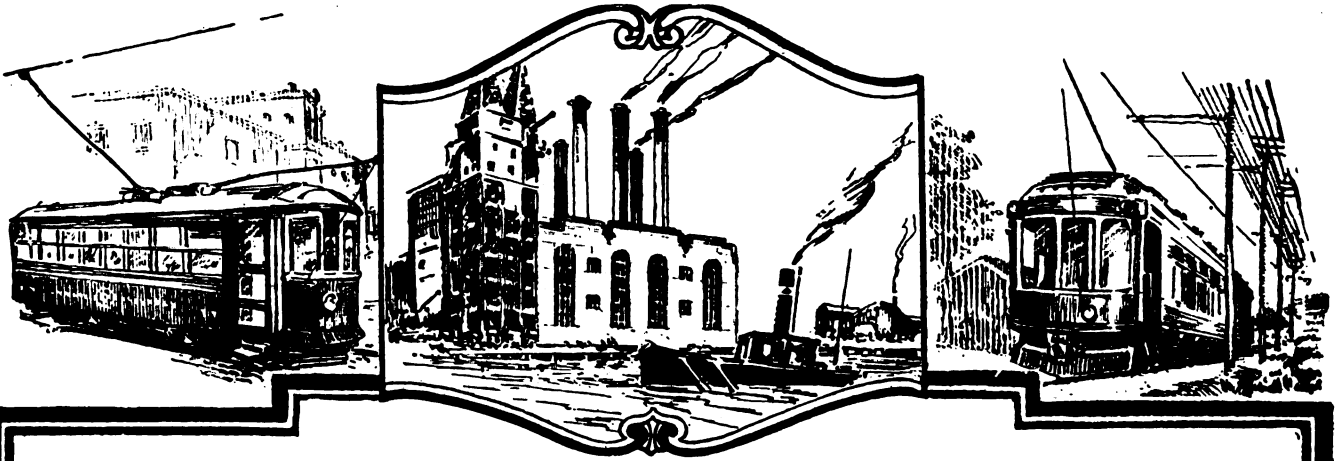
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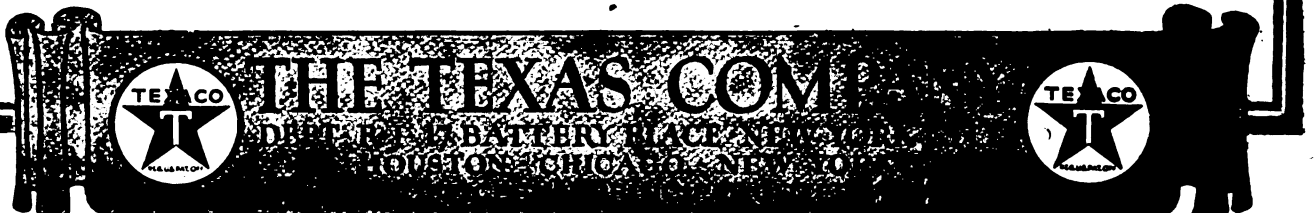
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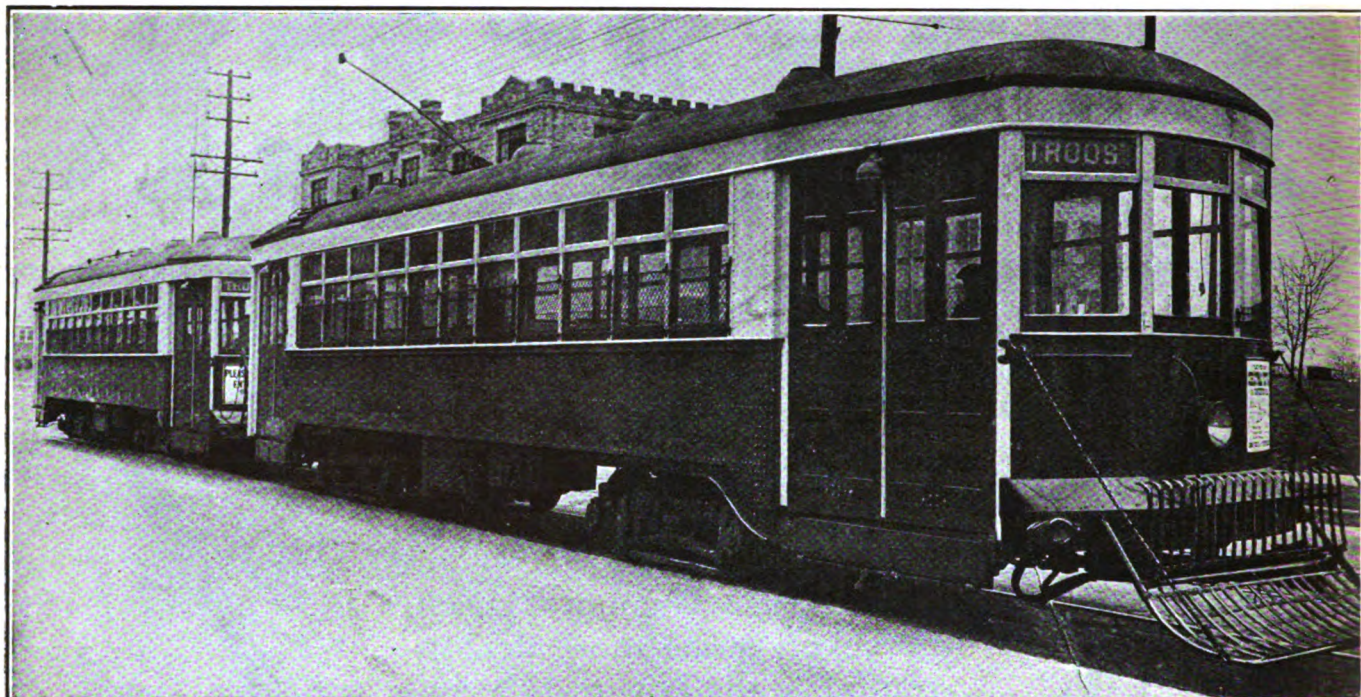
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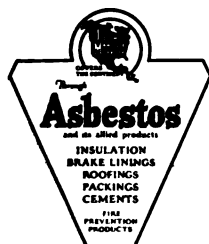
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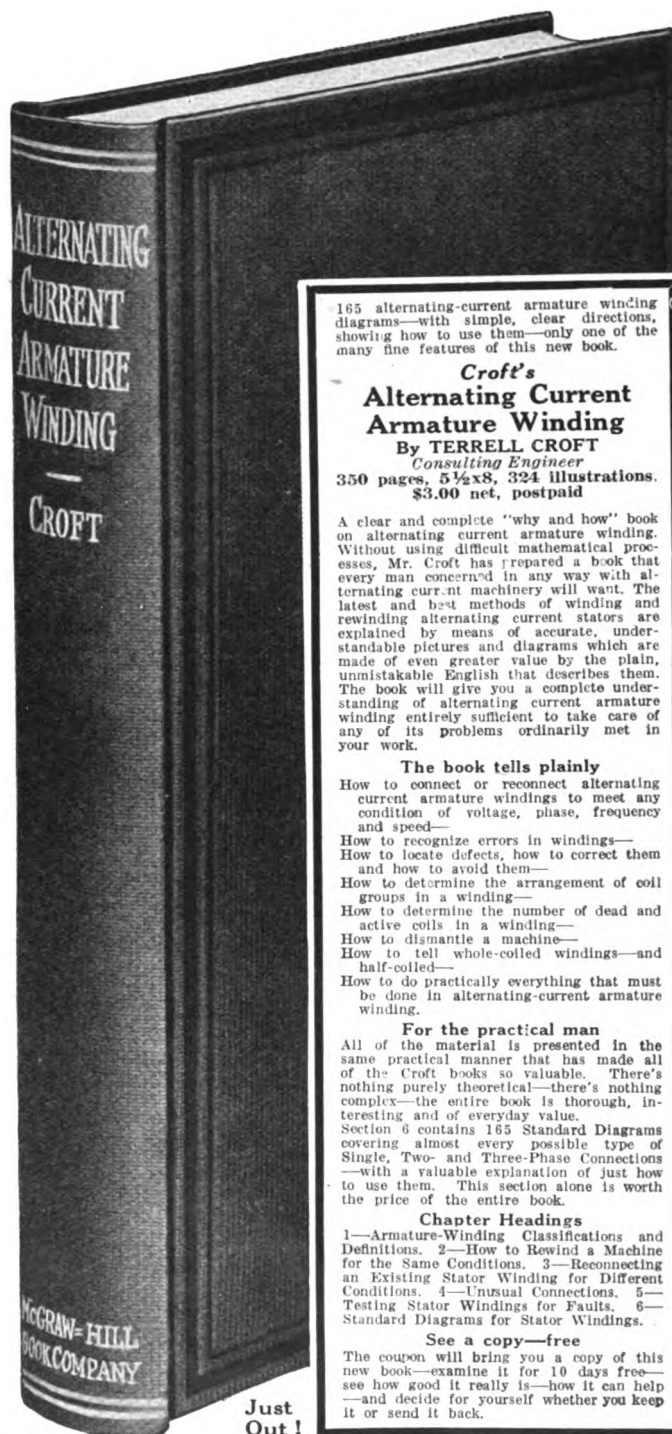
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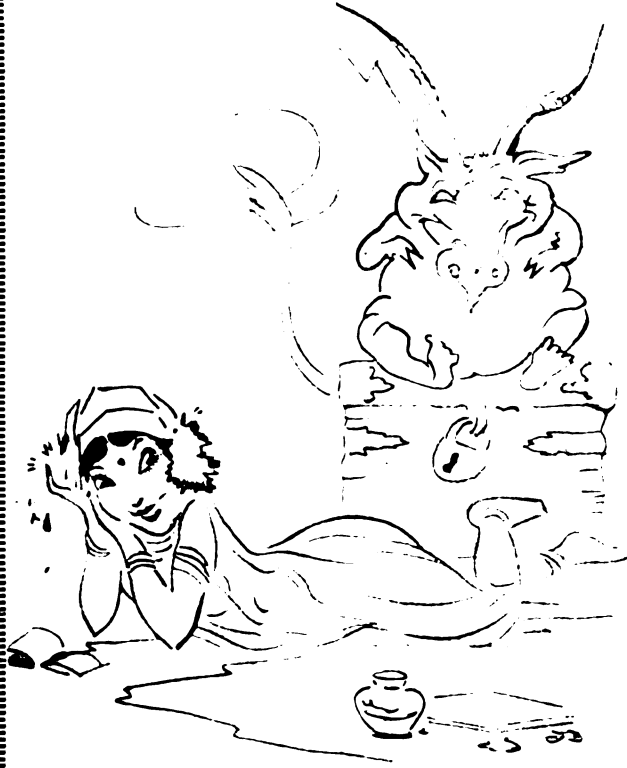
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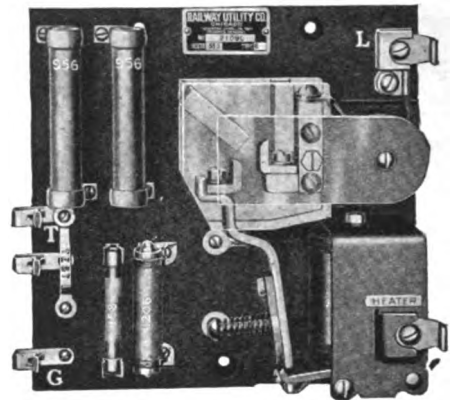
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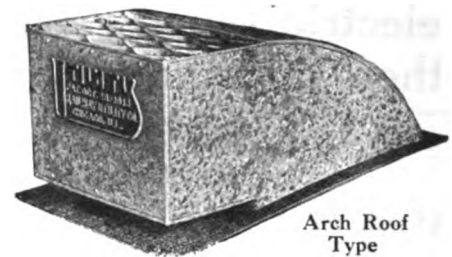
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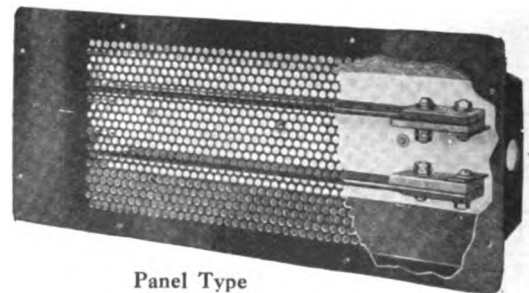


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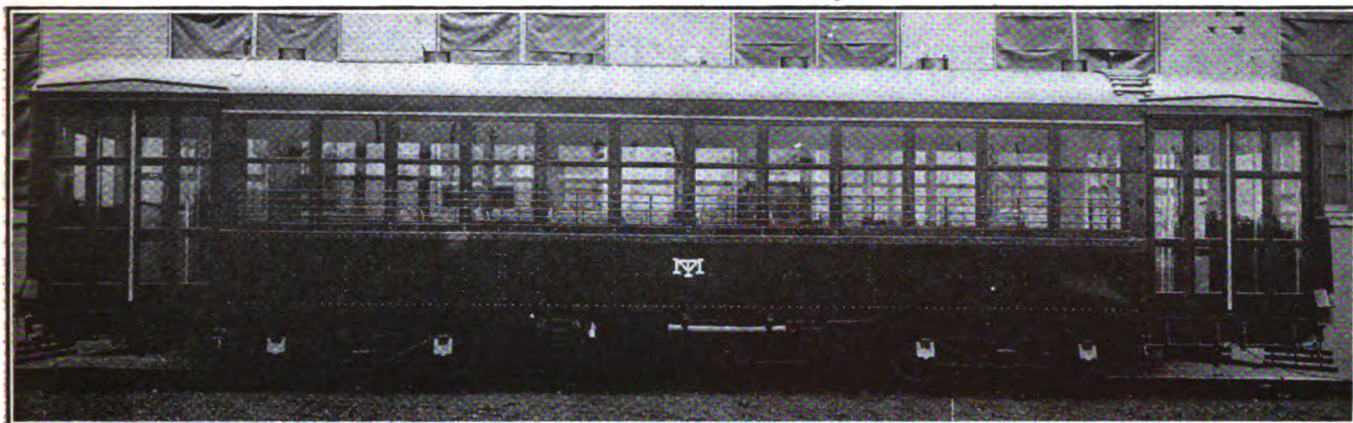
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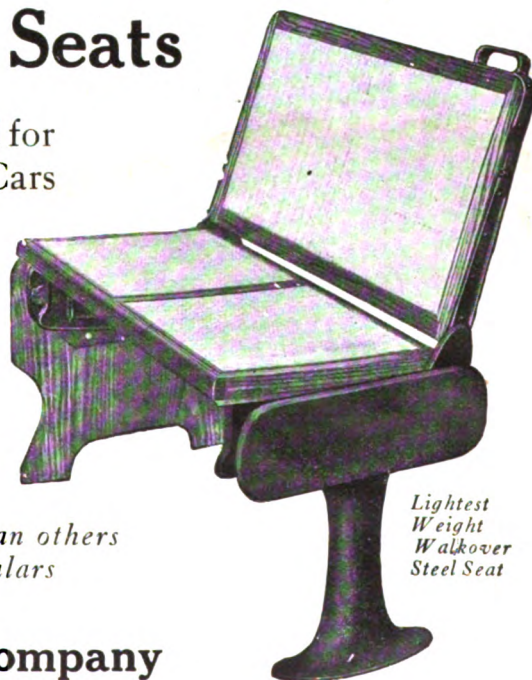
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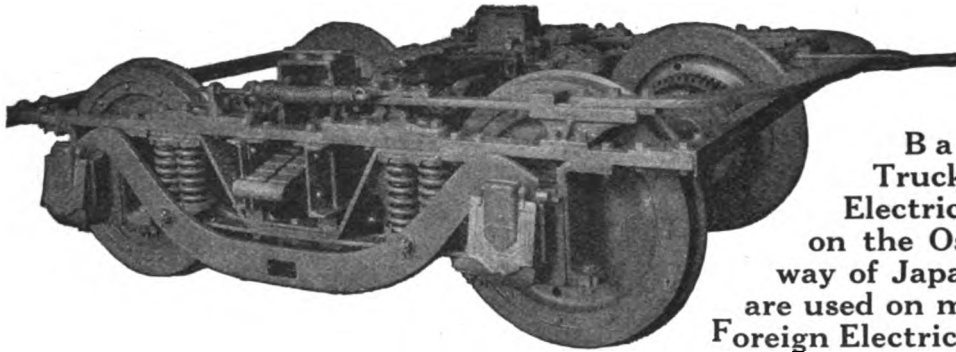
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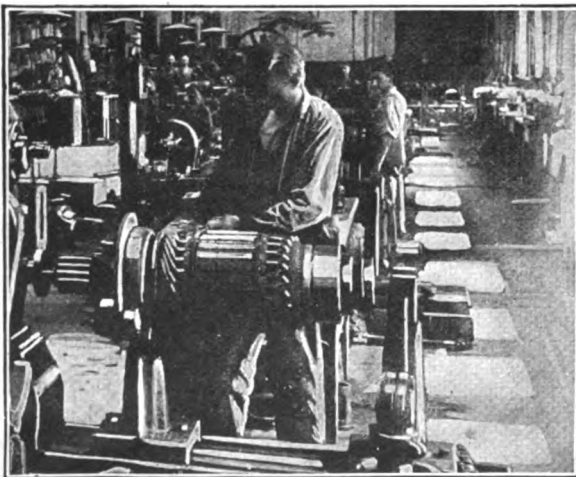
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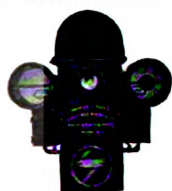


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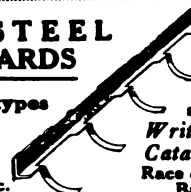
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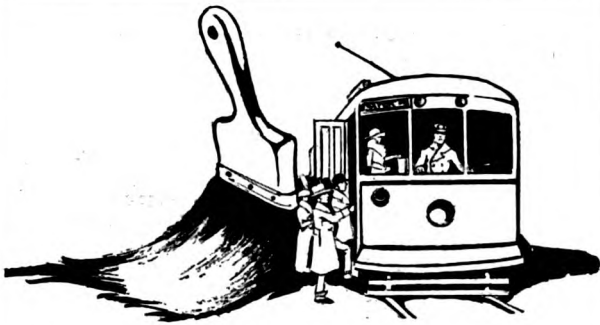
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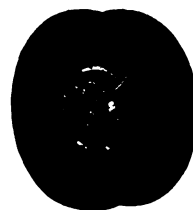
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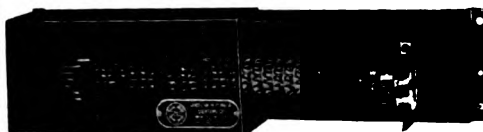
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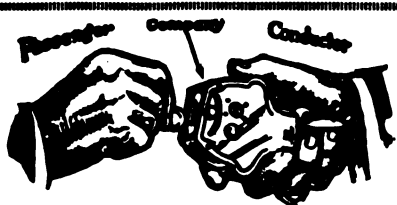
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SALES engineer, young man, who has had shop experience and is thoroughly familiar with railway motors, also car equipment, to travel in the East. State experience, age, salary, education, etc. P-657, Electric Railway Journal, 10th Ave. at 36th St., New York.

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SUPERINTENDENT of transportation wanted; must be good executive and disciplinarian and thoroughly familiar with handling city traffic. P-655, Electric Railway Journal, 10th Ave. at 36th St., New York.

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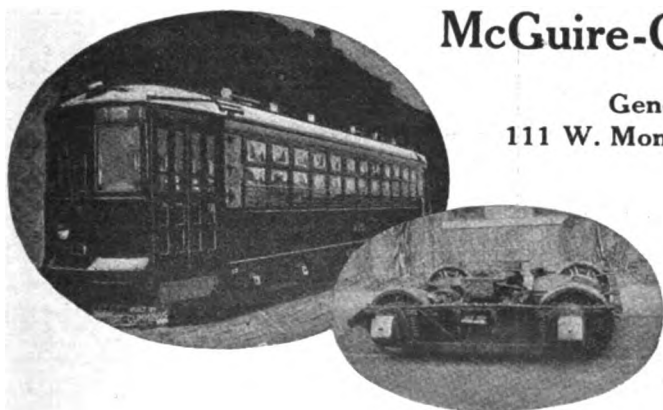
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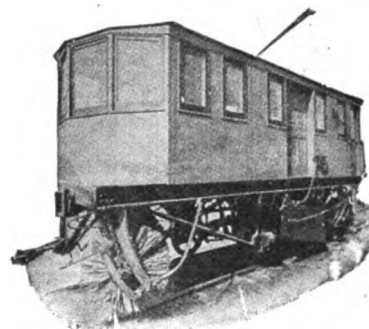
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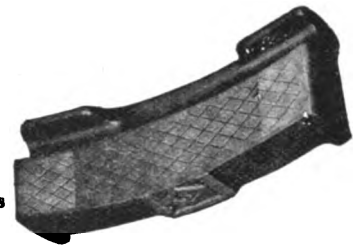
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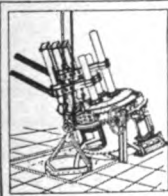
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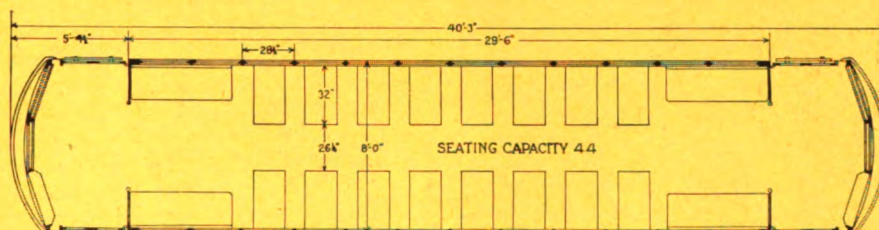
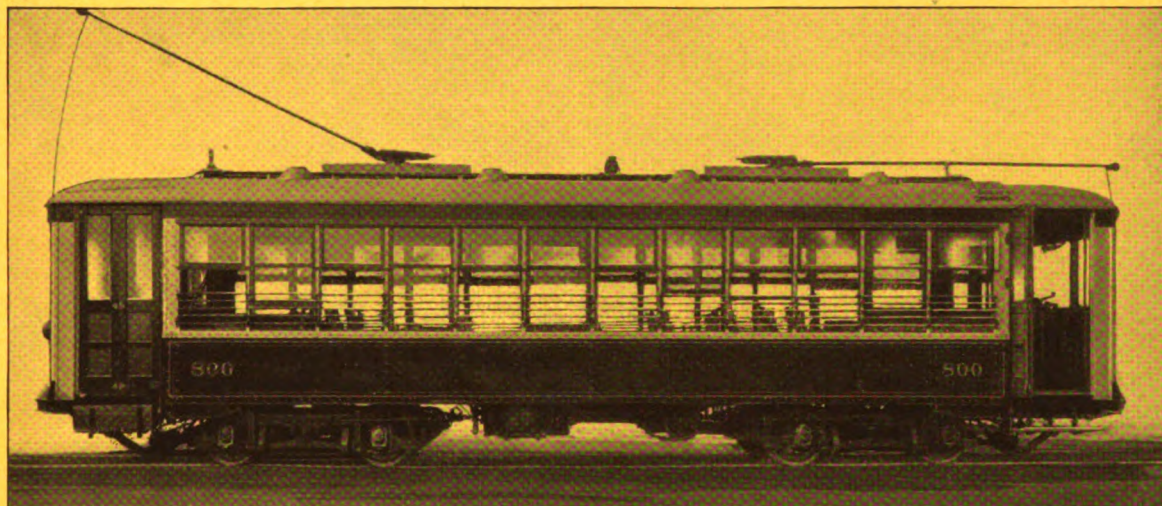
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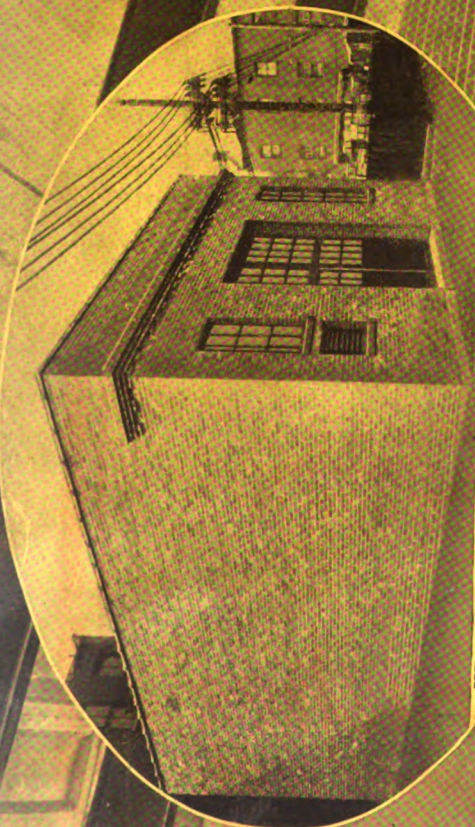


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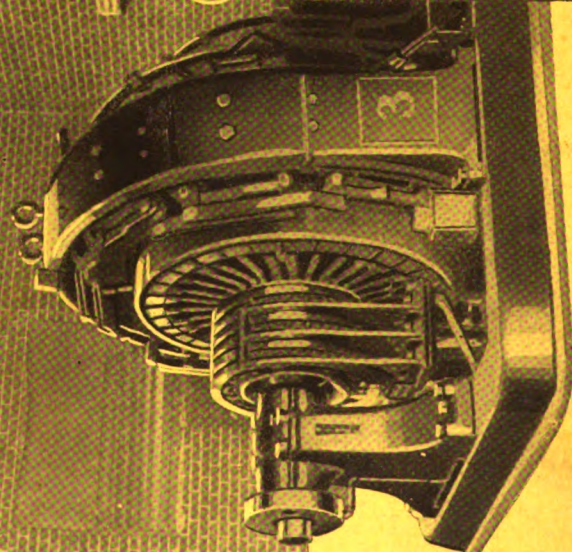
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